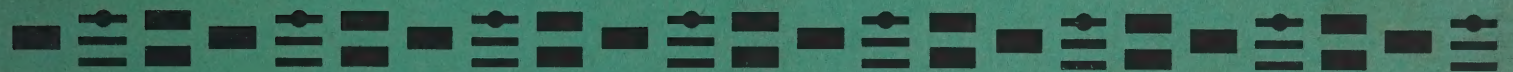


INSTRUCTION BOOK

105A

ATC

TRANSPONDER



Aircraft Radio Corporation

BOONTON • NEW JERSEY

INSTRUCTION BOOK

105A ATC TRANSPONDER



Aircraft Radio Corporation
BOONTON • NEW JERSEY

WARRANTY

Aircraft Radio Corporation warrants each new airborne product to be free of defects in workmanship and material for a period of twelve months from date of original installation. A defective product will be replaced or repaired (at ARC discretion) when returned to ARC, transportation prepaid, by an ARC authorized dealer or service agency. A statement establishing the date of installation must also accompany the defective unit.



Aircraft Radio Corporation will reimburse an ARC authorized dealer or service agency for labor charges and parts replacement incurred in the repair of defective products for a period of ninety days from date of original installation. Request for payment (or credit) must be made by an authorized ARC dealer or service agency on an ARC supplied form, number 1888A (Warranty Service Report and Invoice). Such charges shall be billed at the authorized dealer or service agency normal shop labor rates.

This warranty shall not apply to any ARC product which, in the judgment of ARC, has been repaired or altered in any way so as adversely to affect its performance or reliability or has been subject to misuse, negligence or accident. This warranty is in lieu of all other guarantees or warranties expressed or implied. The obligation and responsibility of ARC for or with respect to defective equipment shall be limited to that expressly provided herein and ARC shall not be liable for consequential or other damage or expense whatsoever therefor or by reason thereof.

ARC reserves the right to make changes in design or additions to or improvements in its equipment without obligation to make such changes or to install such additions or improvements in equipment theretofore manufactured.

ARC will make available repair components when requested by the authorized ARC dealer, using Form 1888A for these requisitions.

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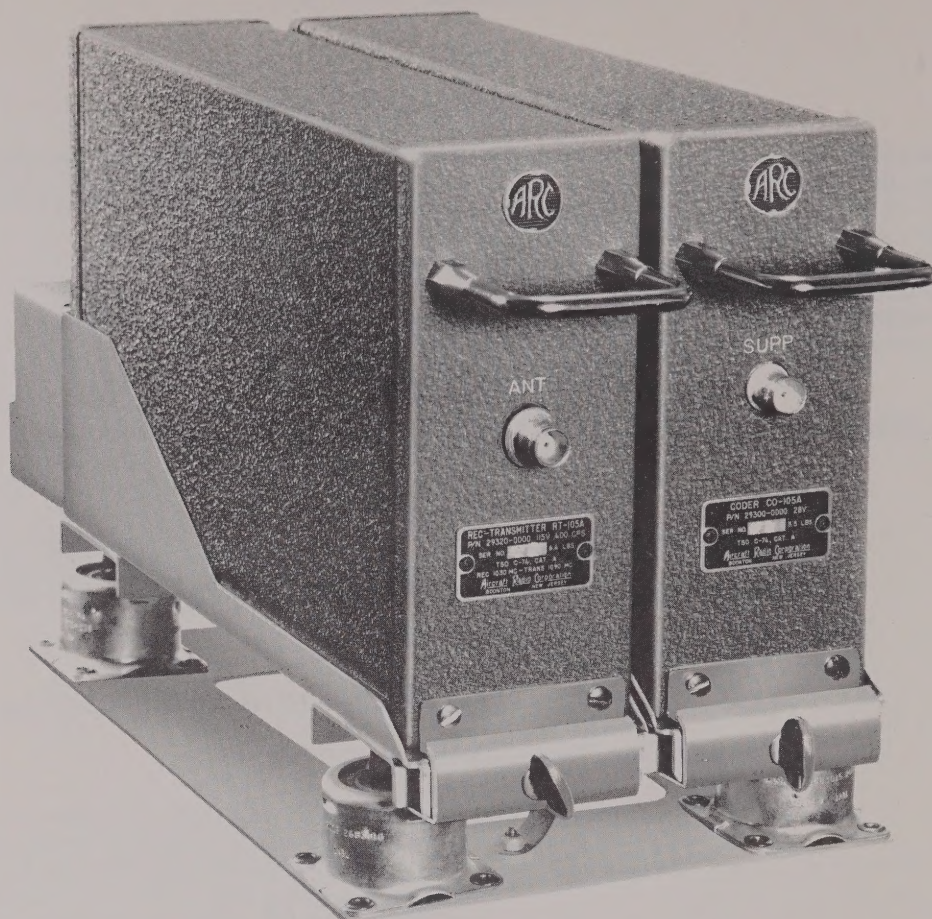
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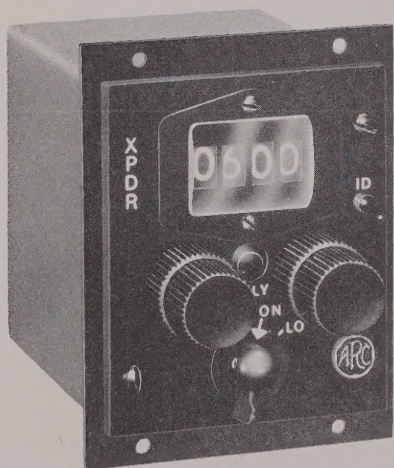
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RT-105A RECEIVER-TRANSMITTER
CO-105A CODER
M-42A MOUNTING



C-105B CONTROL UNIT



A-105A ANTENNA

Figure 1-1. 105A ATC Transponder Set

FCC LICENSING DATA

Application for an aircraft radio station license for the RT-105A Receiver-Transmitter must be made on FCC Form 404. In response to Item 4 on Form 404-1 and the similar item on Form 404-2 (both forms are portions of Form 404), check "other frequencies" box and specify: "P9 1090 mc." In response to Item 5 on Form 404-1 and the similar item on Form 404-2, insert:

<u>Manufacturer</u>	<u>Type No.</u>
Aircraft Radio Corporation	RT-105A
Boonton, New Jersey, U.S.A.	

Complete technical information is on file with the Federal Communications Commission. In response to Item 13 (Part III, Form 404-1), insert: "On file with FCC."

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

This instruction book contains installation, operation, principles of operation, and maintenance information for the 105A ATC Transponder Set manufactured by Aircraft Radio Corporation, Boonton, New Jersey. The major units are shown in Figure 1-1.

1-2. PURPOSE.

The 105A ATC Transponder is the airborne unit of an Air Traffic Control Radar Beacon System (ATCRBS). Use of the transponder enables the ATC ground controller to see and identify the aircraft in flight at distances beyond the primary radar range. The transponder receives interrogating pulse signals on 1030 megacycles and transmits coded pulse-train reply signals on 1090 megacycles. It is capable of replying to Mode 3/A (aircraft position identification) and Mode C (altitude information) interrogations on an automatic selective reply basis on any of 4096 information code selections.

Note

At the present time, the ATCRBS uses only the Mode 3/A (aircraft position identification) capability, and the information codes for transponder replies are selected from 64 basic reply code assignments. In the future, the transponder Mode 3/A reply codes may be selected from 4096 expanded reply code assignments. The transponder will reply on any of the basic or the expanded reply codes without adjustment or modification.

When the Mode C (altitude reporting) capability is added to the ATCRBS, an altitude encoder unit will be available to select the Mode C replies. The altitude encoder will automatically provide information from an aneroid source in the aircraft.

1-3. SPECIFICATIONS.

Certification: FAA TSO-C74

Dimensions: See Figures 2-1, 2-2, 2-3, 2-5, 2-7

Weight: 14.2 pounds

Input Power: 0.25 ampere at 27.5 volts dc and
50 volt-amperes at 115 volts ac, 400 cps

Distance Range: 200 nautical miles

Altitude Range: Sea level to 30,000 feet

Operating Frequency: Receiver - 1030 mc
Transmitter - 1090 mc

Modes of Operation: Mode 3/A and Mode C, selected automatically

Mode 3/A Reply Code Capability: Any of 4096

Mode C Altitude Reporting Capability: With optional altitude encoder (when available) 100-foot increments
from -1000 to +126,000 feet

Frequency Control: Tuned-cavity resonators

Receiver Sensitivity: -72 to -80 dbm

Receiver Selectivity: Less than 3 db attenuation at ± 5 mc
Greater than 60 db attenuation at ± 25 mc

Transmitter Power Output: 500 to 1000 watts peak

1-4. UNITS AND ACCESSORIES.

The units and accessories available for a transponder installation are listed in Table 1-1.

TABLE 1-1. UNITS AND ACCESSORIES

Qty	Name	Type No.	Part No.
1	Receiver-Transmitter	RT-105A	29320
1	Coder ¹	CO-105A	29300-0000
			29300-0100
1	Control Unit	C-105B	32740
1	Antenna	A-105A	29290
1	Filter	FL-105A	32920
2	Mounting ²	M-41A	21790
1	Mounting ²	M-42A	22510
3	Connector	UG-88C/U	11337
1	Connector	UG-89C/U	12958
1	Connector	8000-1	28776
1	Connector Kit (for RT-105A)	—	32748
1	Connector Kit (for CO-105A)	—	32749
1	Connector (for C-105B)	—	32779-0003
2	Clips (for FL-105A)	—	33279
1	Self-Test Kit ³ consisting of:	—	34131
1	Information Plate	—	34123
2	Screw, Phillips, Round-head, self-tapping	—	8956-2010

semble the selected reply pulse train for the interrogation mode. The regulated power supply converts the 28-volt dc input to +20 vdc, +15 vdc, +10 vdc, +5 vdc, and a variable 0 to +0.2 vdc. The AOC circuits limit the receiver sensitivity when an excessive number of sidelobe interrogations are received, when the reply rate exceeds the preset limit, or when the transmitter output tube exceeds its .01 duty cycle.

Control Unit. The C-105B Control Unit controls the application of power to the transponder set, and selects the "low sensitivity" function, the Mode 3/A reply code, and the special position identification (SPI) pulse referred to in this instruction book as the IDENT pulse.¹ A reply-monitor indicator lamp provides a visual indication of transponder operation. The front panel is edge-lighted by six subminiature lamps.

The a-c and the d-c input voltages to the transponder set are controlled by the OFF, SBY (standby), and ON positions of the function switch. The "low-sensitivity" function is selected by the LO position of the switch. Four rotary switches are used to select the Mode 3/A reply code. The IDENT pulse is selected by depressing the ID switch button.

Antenna. The A-105A Antenna is a quarter-wave uhf antenna encapsulated with foam and sealed in a hard plastic shell. The antenna is terminated with a UG-625/U connector and is designed to match 50-ohm coaxial line. It is mounted on the belly of the aircraft in any location that will not affect the antenna pattern when the aircraft is in flight.

Filter. The FL-105A Filter is a low-pass filter used to suppress harmonics of the transmitter output frequency. It is housed in a silver-plated cylinder and each end is terminated with a BNC connector.

Mountings. The M-42A Mounting is used to shock-mount the receiver-transmitter and the coder. These units may be shock-mounted individually using the optional M-41A Mountings. The units are secured by adjustable flanges on the front of each mounting. Flexible metal straps, on the underside of the mounting, are used to ground the units and the mountings to the airframe. Electrical connections to the units are made through connectors assembled in the coupling boxes on the back of the mountings.

1-7. PRINCIPLES OF ATCRBS.

The ATCRBS is a secondary surveillance radar system used by air traffic control facilities to aid in the position identification of aircraft in flight. It is comprised of a ground-based interrogator-receiver, an airborne transponder, and an air traffic control radar scope.

The ground-based interrogator transmits interrogation signals at 1030 megacycles from a rotating antenna. The transponder receives and decodes the interrogation and transmits a selected reply code at 1090 megacycles. The ground-based receiver decodes the reply and displays it on a radar scope. Aircraft position, in relation to the ground station, is visually presented for the air traffic controller.

1-8. REPLY CODE PULSE IDENTIFICATION AND SPACING.

The presence or absence of the twelve information pulses in a transponder reply is used to convey flight information to the ground controller. Each of the twelve pulses has a permanent identification and pulse position number in the reply pulse-train signal. The pulses are divided into four groups of three pulses which are identified as the A, B, C, and D groups. Each pulse within a group is assigned an identification number which fixes its position in the reply pulse-train. The numbers used, 1, 2, and 4, form a binary code in which their various sums give the maximum number of combinations, without repetition, for any three numbers. Any digit from 0 to 7 can be obtained within a pulse group, thus any number between 0000 and 7777 can be selected for the transponder reply.

¹The control unit will also be used to select the remote keying function (selected by setting the reply code dial to 8888) when this function is incorporated in the ATCRBS.

TABLE 1-1. UNITS AND ACCESSORIES - Continued

Qty	Name	Type No.	Part No.
	Self-Test Kit (continued):		
1	Printed Circuit Assembly	—	34095
6	Screw, Fillister-head	—	162-0012
2	Post	—	33113-0048
1	Printed Plate	—	34097
1	Toggle Switch	—	34125-0005
1	Toggle Switch	—	34124-0002

¹Part No. 29300-0100 is equipped with self-test feature. Either coder is supplied as specified.

²Either one dual mounting or two single mountings are supplied as specified.

³Optional. Kit is factory-installed in coder, Part No. 29300-0100.

1-5. CABLE ASSEMBLIES REQUIRED BUT NOT SUPPLIED.

Interconnecting cable assemblies are not supplied but are fabricated from individual wires and coaxial cables (not supplied) and the connectors listed in Table 1-1. Wire sizes and connectors are illustrated in Figure 2-11. The actual lengths of the wires and cables will depend on the location of the equipment in the aircraft.

1-6. DESCRIPTION OF UNITS.

Receiver-Transmitter. The RT-105A Receiver-Transmitter is an airborne r-t unit which includes a pulse-modulated transmitter, the r-f and mixer circuits of a receiver, and a high-voltage power supply. A diplexer at the antenna input permits the use of a common antenna for both reception and transmission without external switching.

Except for the power oscillator, all transmitter circuits use transistors. The power oscillator uses a "light-house" electron tube operating in a cavity resonator. The cavity resonator, tuned to 1090 megacycles, controls the transponder output frequency. A reply monitor circuit provides an indication of transponder operation.

The receiver uses a superheterodyne circuit tuned to receive the 1030-mc interrogation signal. The triple-tuned preselector, local oscillator cavity resonator, mixer assembly, and 60-mc preamplifier assembly of the receiver are included in the r-t unit.

The high-voltage power supply converts the 115-volt ac, 400-cps input into +1800 vdc, +68 vdc, +39 vdc, -82 vdc, 6.3 vac, and 6.0 vac. An automatic time-delay relay prevents the application of high voltage to the transmitter output tube until the proper operating temperature has been reached.

Coder. The CO-105A Coder includes a portion of the receiver, the decoder and encoder circuits, and a regulated dc power supply. The unit is comprised of assemblies A1, A2, and A3. When the optional self-test feature is included in the transponder set, assembly A4 is mounted in the coder unit.

I-f amplifier-detector assembly A1 is part of the receiver circuit. It consists of five i-f amplifier stages and the video detector and amplifier circuits.

Decoder assembly A2 is a printed-circuit board assembly which includes the circuits for recognizing and decoding proper interrogating signals in either Mode 3/A or Mode C.

Assembly A3 is a printed-circuit board assembly which includes the encoder circuits, the regulated power supply, and the major portion of the automatic overload control (AOC) circuits. The encoder circuits as-

The digits of the assigned code number indicate the code groups to be used and the pulse coding within the group. When the assigned code is a four-digit number (any of 4096), the "thousands" digit designates the A group, the "hundreds" digit the B group, the "tens" digit the C group, and the "units" digit the D group. For a two-digit assigned code (any of 64), only the A and the B groups are used, and the absence of the C and D pulse groups is indicated by setting the "tens" and the "units" dials to 0. Information pulses present in assigned reply codes for both two-digit and four-digit coding are shown in Table 1-2.

The A and the B pulse groups are spaced at 2.9-microsecond intervals between the framing pulses, and the C and D pulse groups are interspaced at 1.45-microsecond intervals. Table 1-3 lists the pulse number, pulse designation, and microsecond position of the sixteen pulses or pulse spaces which comprise the reply pulse train. Each discrete pulse will always occur at the same time interval, regardless of the number of pulses in the selected code. Figure 1-2 illustrates pulse spacing for typical reply pulse-trains.

TABLE 1-2. ATCRBS REPLY CODE NUMBERS

Basic 64-Code No.	Expanded 4096-Code No.	Information Pulses Present	Basic 64-Code No.	Expanded 4096-Code No.	Information Pulses Present
00	0000	None	30	3000	A1, A2
—	0001	D1	31	3100	A1, A2, B1
—	0002	D2	32	3200	A1, A2, B2
—	0003	D1, D2	33	3300	A1, A2, B1, B2
—	0004	D4	34	3400	A1, A2, B4
—	0005	D1, D4	35	3500	A1, A2, B1, B4
—	0006	D2, D4	36	3600	A1, A2, B2, B4
—	0007	D1, D2, D4	37	3700	A1, A2, B1, B2, B4
—	0010	C1	40	4000	A4
—	0020	C2	41	4100	A4, B1
—	0030	C1, C2	42	4200	A4, B2
—	0040	C4	43	4300	A4, B1, B2
—	0050	C1, C4	44	4400	A4, B4
—	0060	C2, C4	45	4500	A4, B1, B4
—	0070	C1, C2, C4	46	4600	A4, B2, B4
			47	4700	A4, B1, B2, B4
01	0100	B1	50	5000	A1, A4
02	0200	B2	51	5100	A1, A4, B1
03	0300	B1, B2	52	5200	A1, A4, B2
04	0400	B4	53	5300	A1, A4, B1, B2
05	0500	B1, B4	54	5400	A1, A4, B4
06	0600	B2, B4	55	5500	A1, A4, B1, B4
07	0700	B1, B2, B4	56	5600	A1, A4, B2, B4
			57	5700	A1, A4, B1, B2, B4
10	1000	A1	60	6000	A2, A4
11	1100	A1, B1	61	6100	A2, A4, B1
12	1200	A1, B2	62	6200	A2, A4, B2
13	1300	A1, B1, B2	63	6300	A2, A4, B1, B2
14	1400	A1, B4	64	6400	A2, A4, B4
15	1500	A1, B1, B4	65	6500	A2, A4, B1, B4
16	1600	A1, B2, B4	66	6600	A2, A4, B2, B4
17	1700	A1, B1, B2, B4	67	6700	A2, A4, B1, B2, B4
20	2000	A2	70	7000	A1, A2, A4
21	2100	A2, B1	71	7100	A1, A2, A4, B1
22	2200	A2, B2	72	7200	A1, A2, A4, B2
23	2300	A2, B1, B2	73	7300	A1, A2, A4, B1, B2
24	2400	A2, B4	74	7400	A1, A2, A4, B4
25	2500	A2, B1, B4	75	7500	A1, A2, A4, B1, B4
26	2600	A2, B2, B4	76	7600	A1, A2, A4, B2, B4
27	2700	A2, B1, B2, B4	77	7700	A1, A2, A4, B1, B2, B4

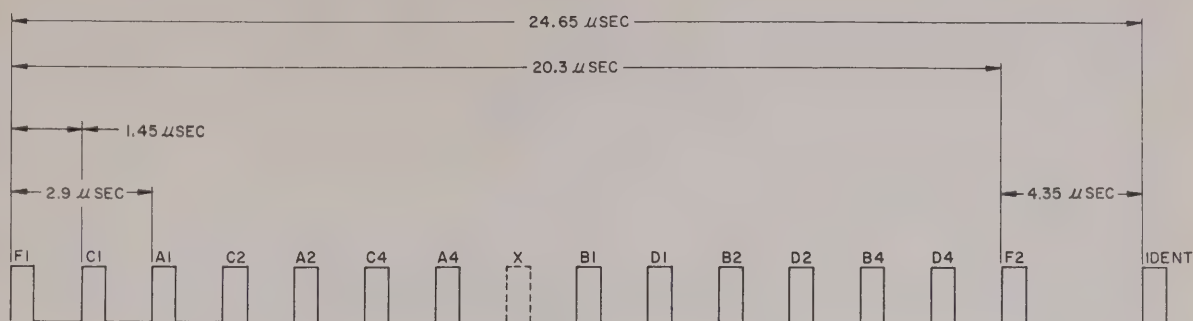
TABLE 1-2. ATCRBS REPLY CODE NUMBERS - Continued

EXAMPLES	
Code No.	Information Pulses Present
1100	A1, B1
0011	C1, D1
3600	A1, A2, B2, B4
0536	B1, B4, C1, C2, D2, D4
0606	B2, B4, D2, D4
6060	A2, A4, C2, C4
7461	A1, A2, A4, B4, C2, C4, D1
7700	A1, A2, A4, B1, B2, B4
0077	C1, C2, C4, D1, D2, D4
7777	A1, A2, A4, B1, B2, B4, C1, C2, C4, D1, D2, D4

TABLE 1-3. REPLY PULSE POSITIONS

Pulse Number	Pulse Designation	Microsecond Position From First Framing Pulse
1	First Framing Pulse	0
2	C1	1.45
3	A1	2.9
4	C2	4.35
5	A2	5.8
6	C4	7.25
7	A4	8.7
8	X ¹	10.75
9	B1	11.6
10	D1	13.05
11	B2	14.5
12	D2	15.95
13	B4	17.4
14	D4	18.85
15	Second Framing Pulse	20.3
16	Special Identification Pulse	24.65

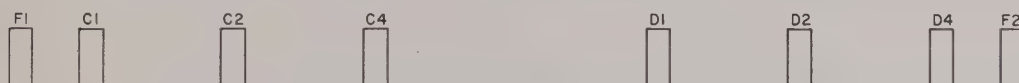
¹"X" pulse has no function in the transponder. The space for X pulse has been reserved by the FAA for future use.



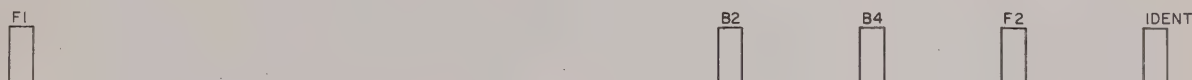
A. PULSE SPACING OF THE SIXTEEN REPLY PULSES, REPLY CODE 7777 WITH IDENT PULSE



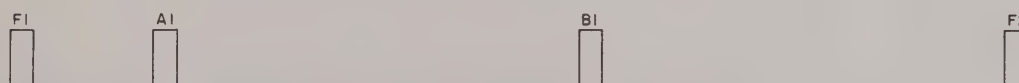
B. PULSE SPACING, REPLY CODE 7700 (77)



C. PULSE SPACING, REPLY CODE 0077



D. PULSE SPACING, REPLY CODE 0600 (06) WITH IDENT PULSE



E. PULSE SPACING, REPLY CODE 1100 (11)



F. PULSE SPACING, REPLY CODE 4536

Figure 1-2. Reply Code Pulse Spacing

TP4281

SECTION II

INSTALLATION

2-1. UNPACKING.

Carefully unpack and inspect the units and accessories for damage. Check the items against the packing slip to be sure all the items have been received and removed from the packing case.

2-2. INSTALLATION REQUIREMENTS.

The location and installation of the transponder set will depend on the aircraft in which the set is installed; however, the following installation requirements apply to all aircraft.

1. Refer to the installation diagrams in this manual. Check that the proposed installation area can accommodate the units to be installed.
2. Install the units in an area where they will be accessible for inspection and maintenance, but not subject to excessive heat or vibration.
3. When the receiver-transmitter and the coder are individually mounted, locate the units so that the interconnecting cable does not exceed 20 feet.
4. When the dual mounting is used, install the receiver-transmitter in the stall that provides the best ventilation. Use a blower or ram air if necessary to ensure cooling.
5. Allow sufficient clearance on all sides of each unit for sway, ventilation, and easy removal.
6. Leave sufficient space at the rear of the mounting to permit cable connections to be made; arrange the cabling so that shock-mount travel is not restricted. Do not make sharp bends in the cables.
7. Locate the control unit within convenient view and reach of the operator.
8. Locate the low-pass filter so that the coaxial cable between the filter and the antenna is as short as possible, or connect one end of the filter directly to the antenna.
9. If the required length of antenna cable between the receiver-transmitter and the antenna is 15 feet or less, use the BNC connectors supplied and RG-58/U coaxial cable. If the required length of antenna cable is greater than 15 feet, use RG-8/U coaxial cable and suitable connectors (not supplied). The RG-8/U cable must not be longer than 35 feet. Use of an antenna cable longer than specified may result in decreased transponder range.

2-3. INSTALLATION OF MOUNTINGS.

Installation dimensions for single-unit and dual-unit mountings are shown in Figures 2-1, 2-2, and 2-3. To install a mounting, proceed as follows:

Step 1. Use the bottom plate of the mounting as a template to locate the mounting holes.

Step 2. Drill the required number and size of holes in the mounting surface. Remove any paint and clean the surface around the holes to ensure proper grounding.

Step 3. Secure the mounting with binding head screws, lockwashers, and nuts.

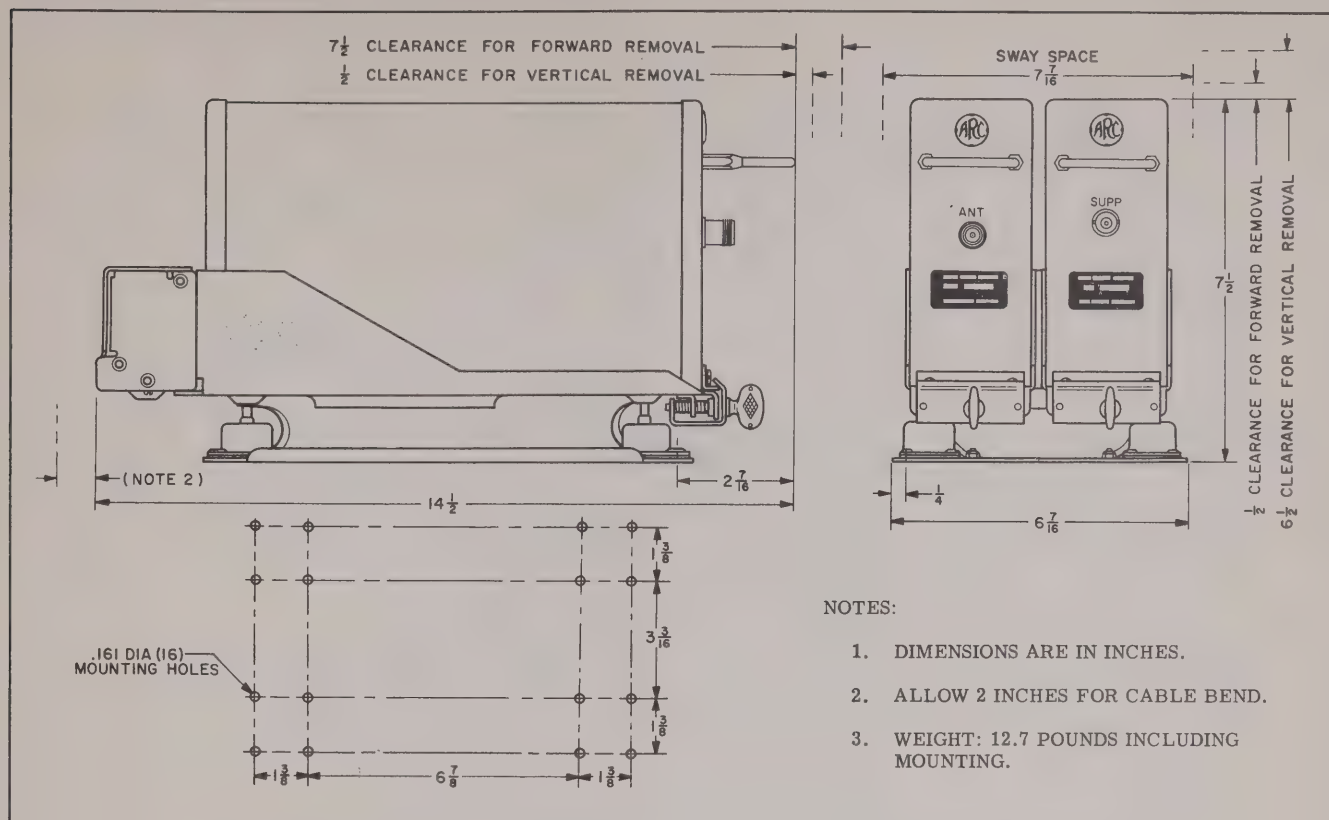


Figure 2-1. RT-105A Receiver-Transmitter and CO-105A Coder with M-42A Mounting, Installation Dimensions

TP4183

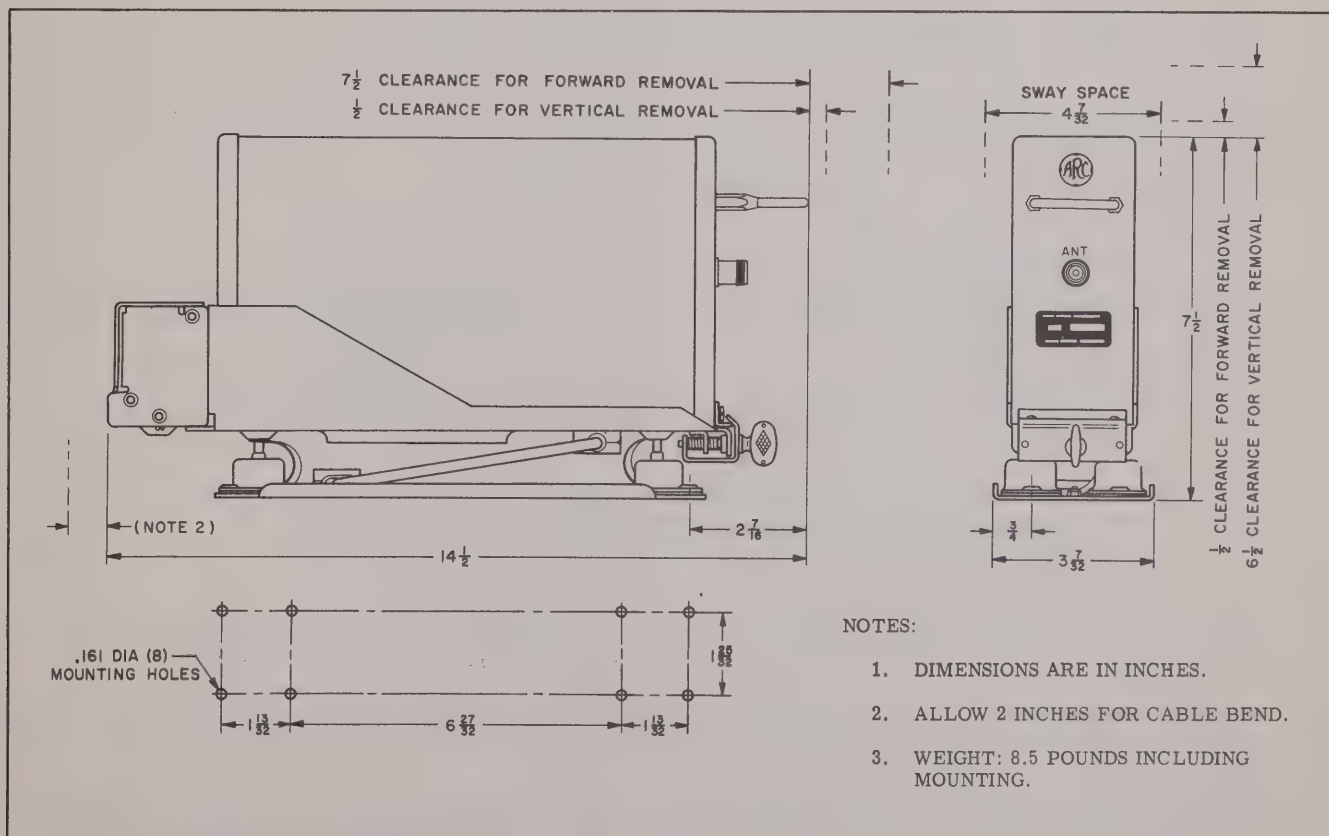


Figure 2-2. RT-105A Receiver-Transmitter with M-41A Mounting, Installation Dimensions

TP4185

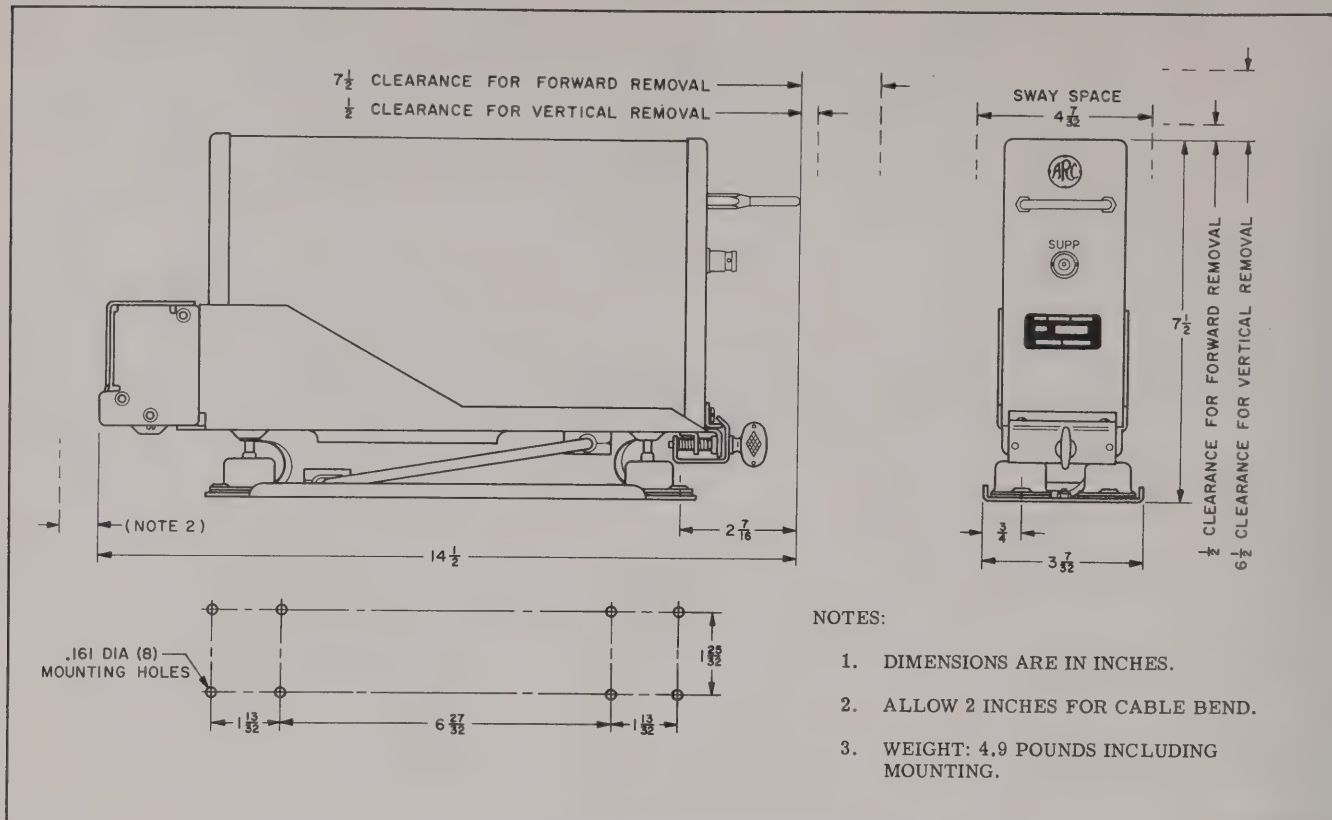


Figure 2-3. CO-105A Coder with M-41A Mounting, Installation Dimensions

TP4187

2-4. INSTALLATION OF RECEIVER-TRANSMITTER AND CODER CONNECTORS.

Except for the antenna and the external suppressor connections, all electrical connections to the receiver-transmitter and the coder are made through connectors installed in the coupling boxes in the mountings. To install the connectors, proceed as follows:

Step 1. Remove the coupling box from the mounting.

Step 2. Remove the coupling box cover, shown in Figure 2-4.

Step 3. Attach the connectors in their required locations and positions on the plates supplied, as shown in Figure 2-4.

Step 4. Refer to Figure 2-11, and solder the required wiring to the connector contacts.

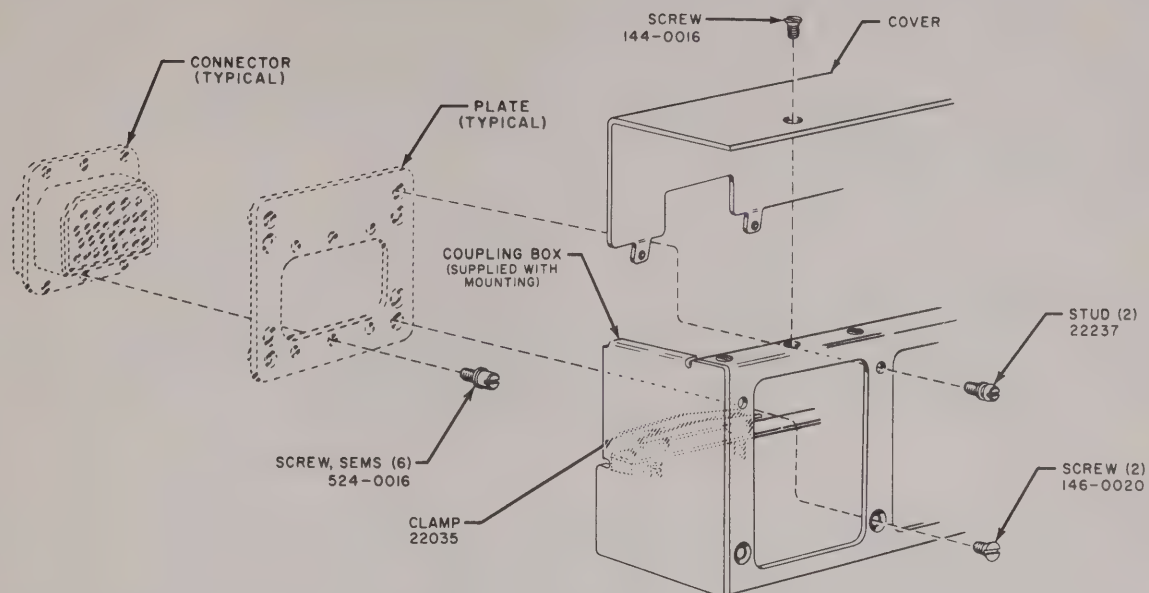
Note

Each connector uses three sizes of contacts. The connector may be used as a holding fixture by inserting the contact part way in the connector hole before soldering. To remove contacts, use Contact Removing Tools 22001, 22002, and 33604.

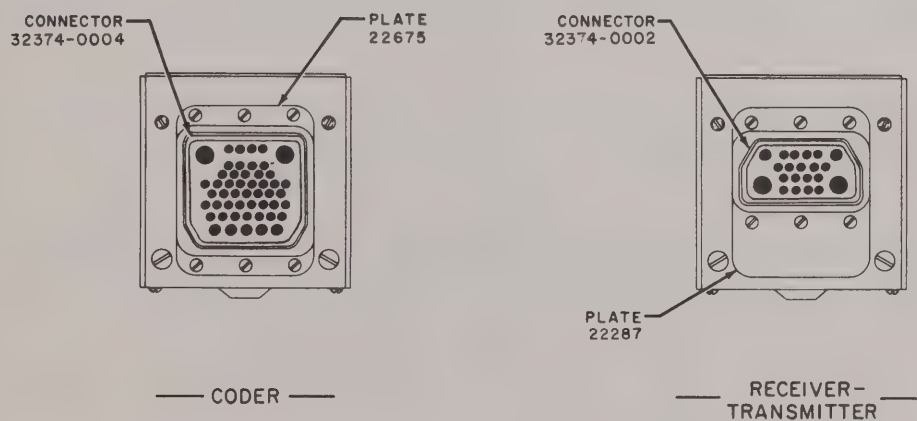
Step 5. Loosen the cable clamp inside the coupling box, and route the contacts and attached wires through the clamp. Insert the contacts in the connector holes. Be sure each contact is seated.

Step 6. Arrange the wires with enough slack to prevent tension on the connector contacts when the clamp is tightened. Tighten the clamp and replace the coupling box cover.

Step 7. Screw in the required number of snapslide studs on the coupling box, as shown in Figure 2-4. Place the coupling box on the rear of the mounting and secure by closing the snapslide fasteners on the mounting.



— COUPLING BOX AND CONNECTOR ASSEMBLY —



— CONNECTOR POSITIONS —

Figure 2-4. Coupling Box and Connectors, Position and Assembly Details

TP4189

2-5. INSTALLATION OF RECEIVER-TRANSMITTER AND CODER.

To install the receiver-transmitter and the coder, proceed as follows:

- Step 1. Loosen the thumbscrew on the front of the mounting.
- Step 2. Slide the unit into its stall until the unit connector and mounting connector are mated.
- Step 3. Secure the unit by positioning the mounting clamp and tightening the thumbscrew.
- Step 4. Safety-wire the thumbscrew.

2-6. INSTALLATION OF CONTROL UNIT.

The control unit is designed for mounting on a 1/16-inch-thick panel. Panels of greater thickness require the use of the adapter plate supplied with the unit. Installation and assembly diagrams are shown in Figures 2-5 and 2-6.

2-7. INSTALLATION OF ANTENNA.

Installation dimensions for the antenna are shown in Figure 2-7. The location and installation of the antenna will depend on the aircraft in which the antenna is installed. Since both the interrogator and the transponder use line-of-sight transmission, the position of the antenna can affect the over-all performance of the transponder. Observe the following recommendations:

1. Locate the antenna on the belly of the aircraft in a location that will not affect the antenna pattern when the aircraft is in flight.
2. Make sure the area around the mounting screw holes are cleaned of any paint or corrosion to ensure proper grounding of the antenna.
3. If the antenna is installed in a pressurized area, or if a weather seal is required, install gasket material between the antenna and the aircraft skin. Install an internal-tooth lockwasher under the head of each mounting screw to ensure that the antenna base is bonded to the aircraft skin.

2-8. INSTALLATION OF LOW-PASS FILTER.

Installation details for the filter are shown in Figure 2-8. Connect one end of the filter directly to the antenna, or locate the filter so that the coaxial cable between the antenna and the filter will be as short as possible. Install the mounting clips as required to support the filter. Mount the filter in the clips, and secure the filter to the clips with safety wire, as shown in Figure 2-8.

2-9. INSTALLATION OF SELF-TEST FEATURE.

Installation of Control Switches. Installation details for the self-test control switches are shown in Figure 2-9. Install the switches in any location that is convenient to the operator. The printed switch panel is printed on both sides to permit either vertical or horizontal switch mounting.

Installation of Printed Circuit Assembly. The self-test printed circuit assembly is factory-installed in coder, part no. 29300-0100. To install the printed circuit assembly in coder, part no. 29300-0000, refer to Figure 2-10, and proceed as follows:

Step 1. Using two of the fillister head screws supplied, mount the two posts to the encoder assembly board.

Step 2. Mount the printed-circuit assembly on the posts and the two threaded inserts provided on the coder chassis. Secure it with the four remaining fillister head screws.

Step 3. Terminate the interconnecting wiring as shown in Figure 6-13.

Step 4. Using the two Phillips head screws, install the information plate below the nameplate on the front panel of the coder unit.

2-10. INTERCONNECTION OF UNITS.

An interconnection diagram for the transponder set is shown in Figure 2-11.

2-11. POST-INSTALLATION CHECKS.

General. No post-installation adjustments of the transponder set are necessary, but post-installation checks should be performed to verify operation. When the optional self-test feature is included in the installation, operation of the transponder set can be checked on the ground. When the self-test feature is not included, operation of the transponder must be checked in the air using an actual ATCRBS interrogation. A flight test should always be performed before considering the equipment operational.

Ramp Check. To check the transponder using the self-test signal, proceed as follows:

Step 1. Turn on the transponder and wait two minutes for the equipment to warm up.

Step 2. Set the self-test RPLY ON-OFF switch to ON.

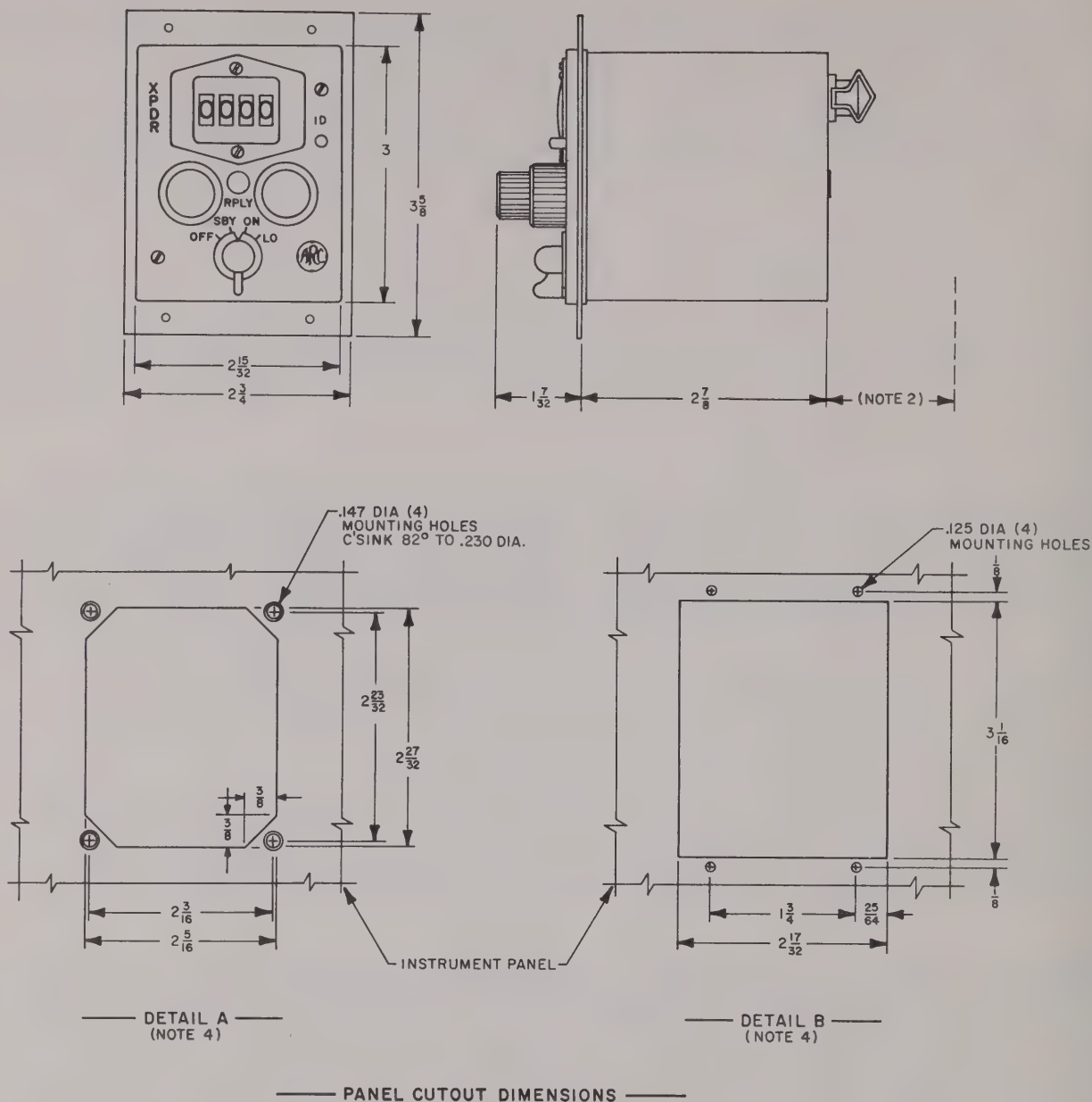
Step 3. Hold the MODE A-C switch in the A position. The reply-monitor lamp on the control unit should light.

Step 4. Hold the MODE A-C switch in the C position. The reply monitor lamp should light.

Flight Check. Although the transponder provides visual indication of operation, the flight check should be coordinated with the local air traffic controller. The controller will designate the Mode 3/A reply code to be used and call for the transmission of the IDENT pulse at the appropriate time. The reply-monitor lamp should light each time the transponder replies to an interrogation.

Note

Check the current copy of "Airman's Guide" or "Airman's Information Manual" for proper and prohibited reply codes.

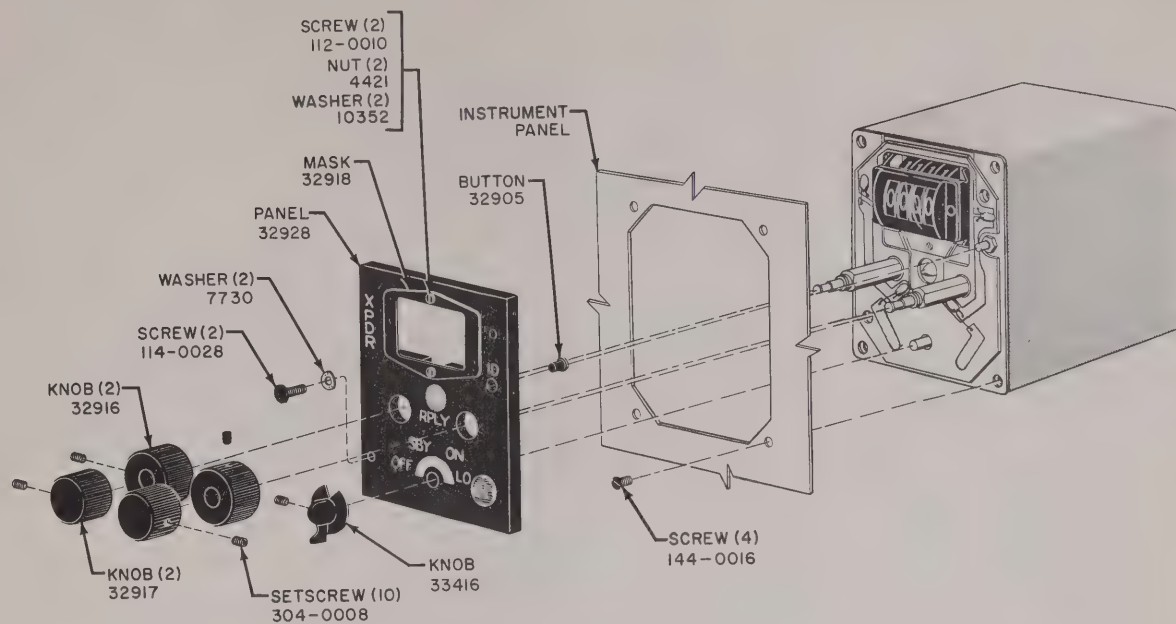


NOTES:

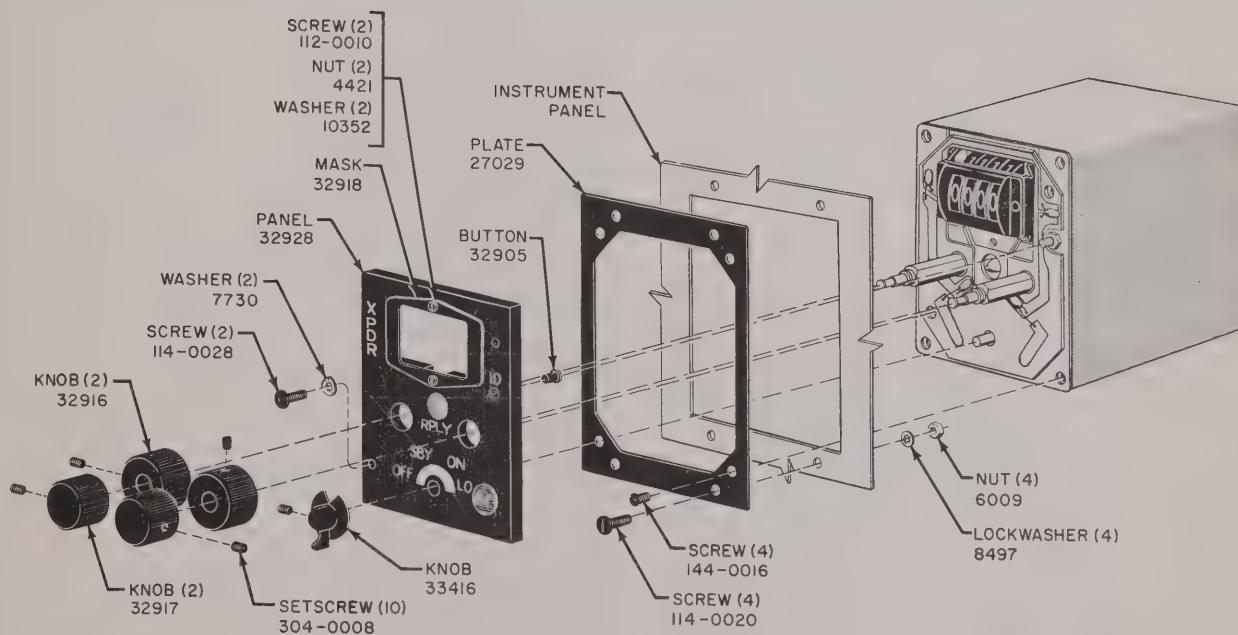
1. DIMENSIONS ARE IN INCHES.
2. ALLOW 2 INCHES FOR CABLE BEND.
3. WEIGHT: 1.1 POUNDS.
4. C-105B MOUNTS DIRECTLY ON 1/16 INCH INSTRUMENT PANEL. UNIT REQUIRES ADAPTER PLATE IF PANEL IS GREATER THAN 1/16 INCH THICK. USE CUTOUT DIMENSIONS, DETAIL A, FOR DIRECT PANEL MOUNTING. USE CUTOUT DIMENSIONS, DETAIL B, FOR MOUNTING UNIT WITH ADAPTER PLATE.

Figure 2-5. C-105B Control Unit, Installation Dimensions

TP4191



— A. WITHOUT ADAPTER PLATE —



— B. WITH ADAPTER PLATE —

Figure 2-6. C-105B Control Unit, Assembly Details

TP4193

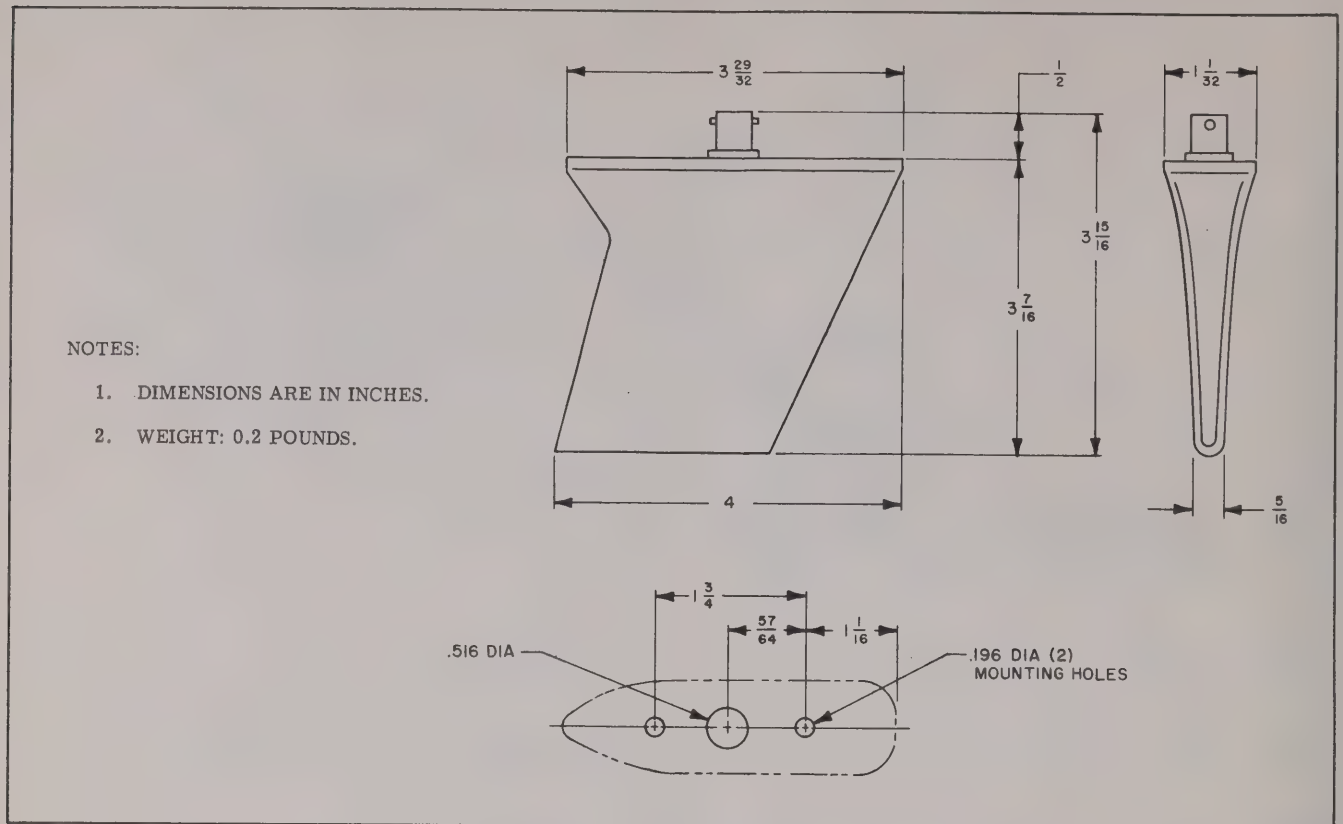


Figure 2-7. A-105A Antenna, Installation Dimensions

TP4095

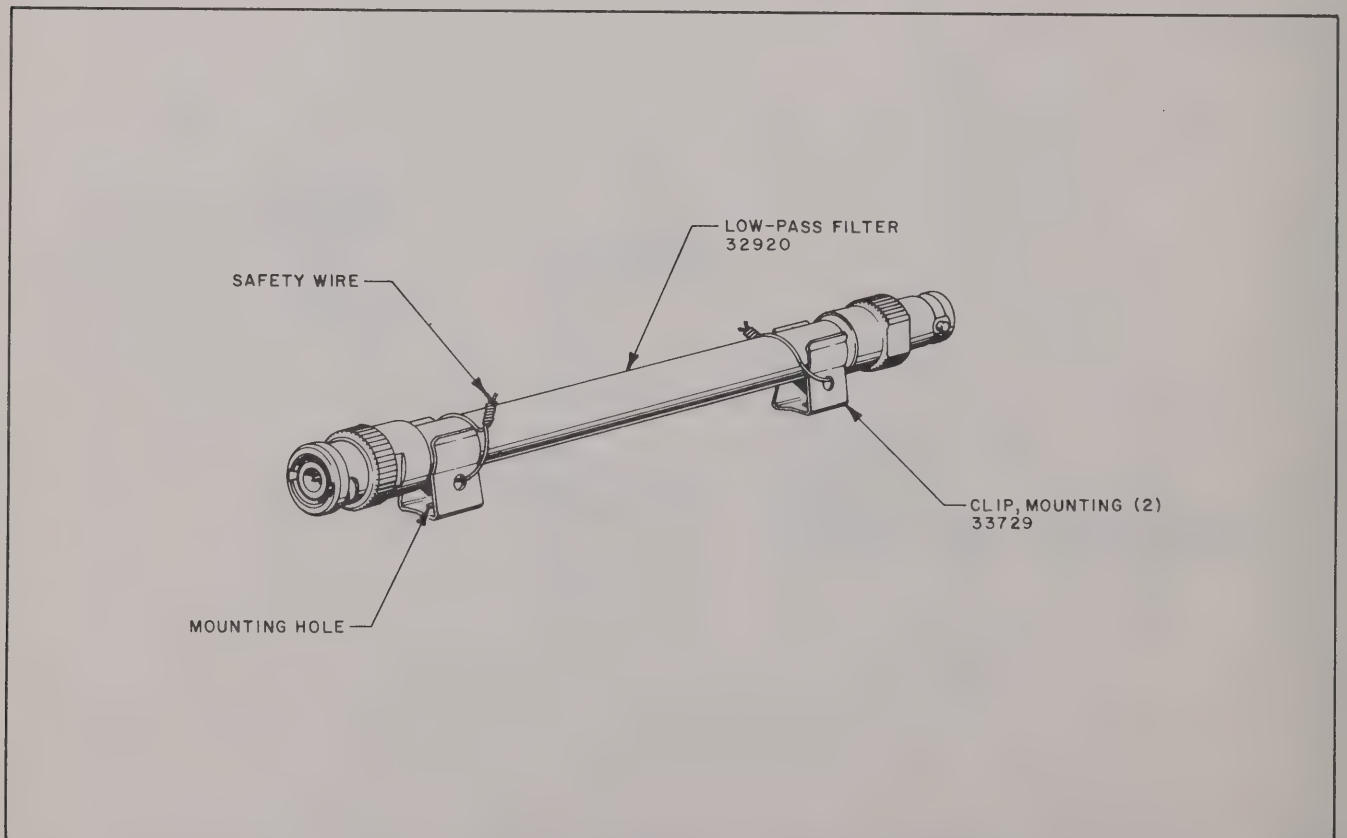


Figure 2-8. FL-105A Filter and Mounting Clips, Installation Details

TP4195

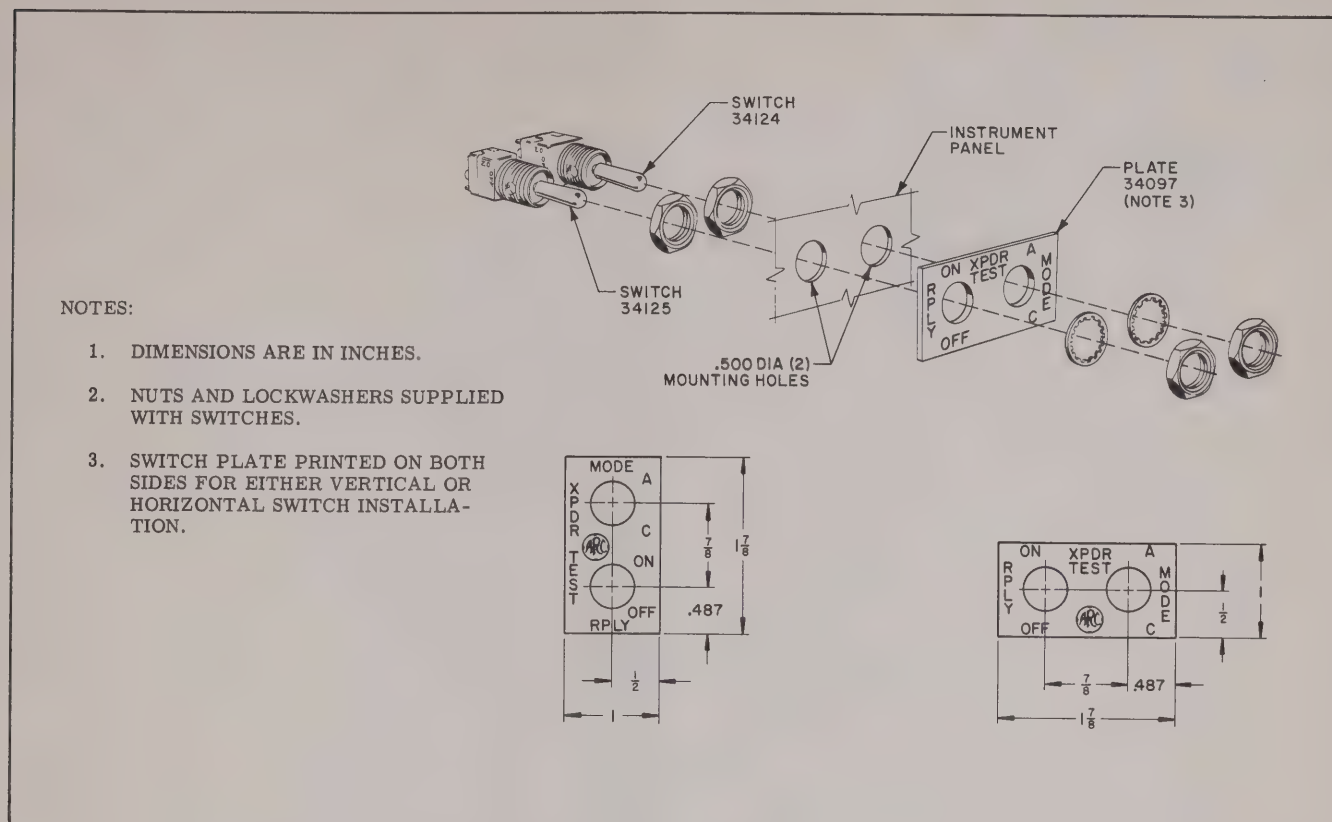


Figure 2-9. Transponder Self-test Control Switches, Installation Details

TP4283

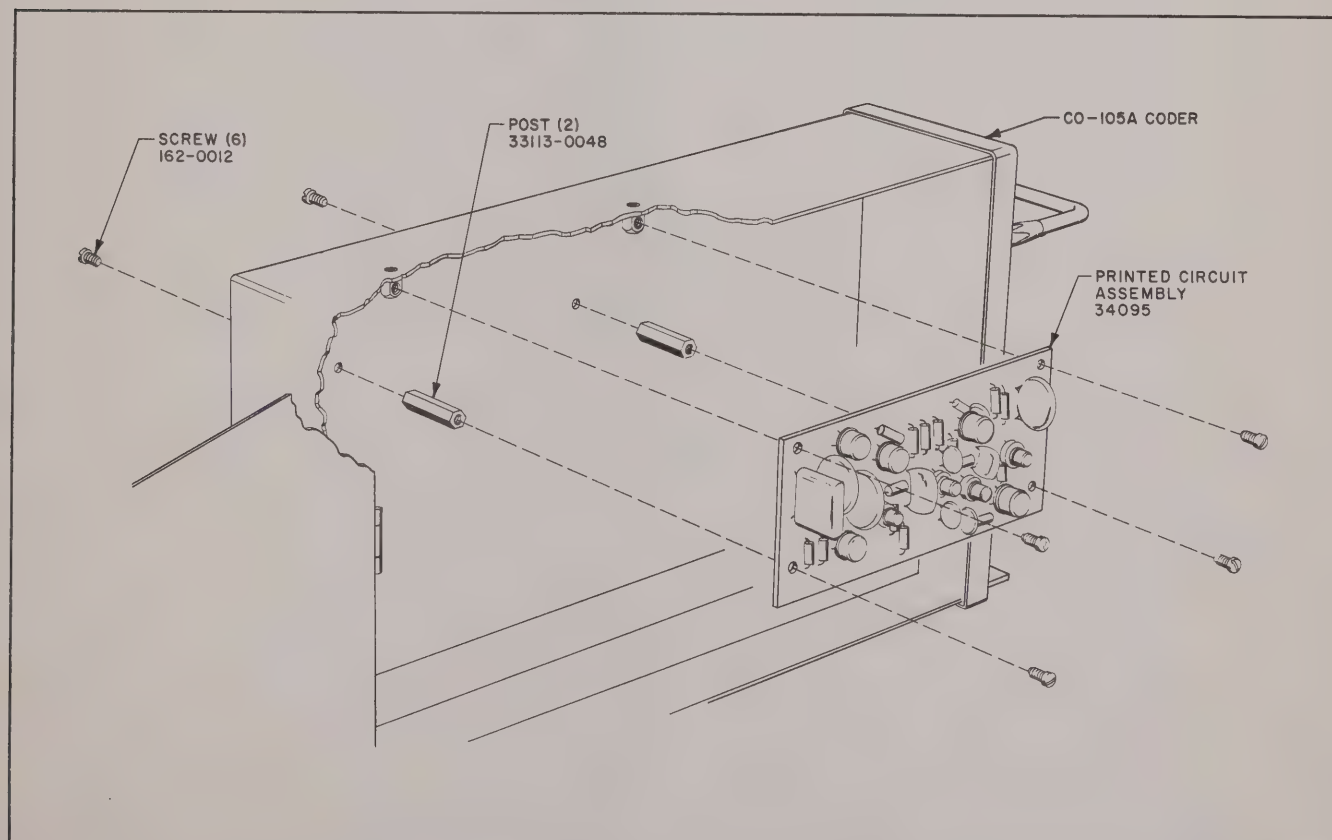
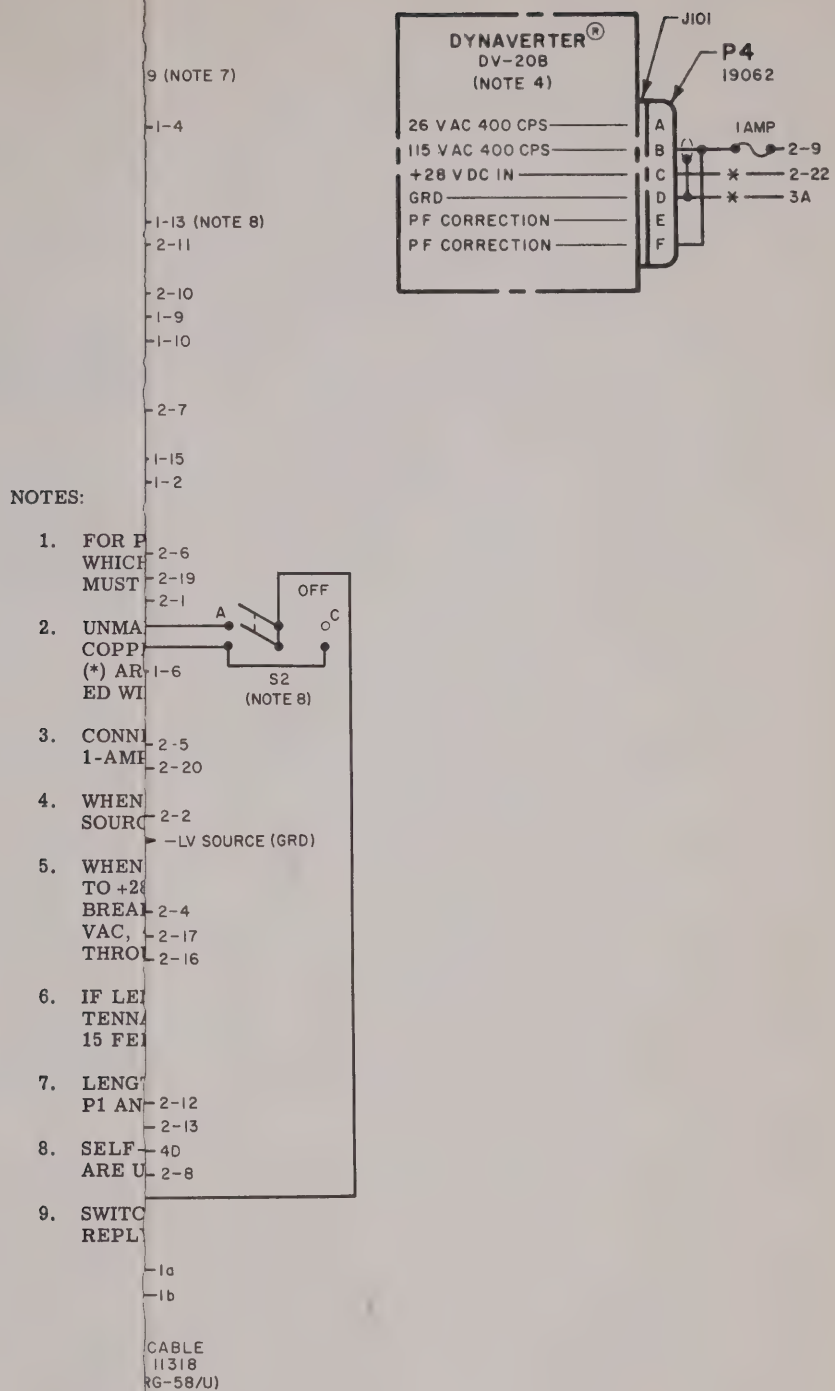


Figure 2-10. Transponder Self-test Kit, Installation Details

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TP3951

Figure 2-11. 105A ATC Transponder, Interconnection Diagram

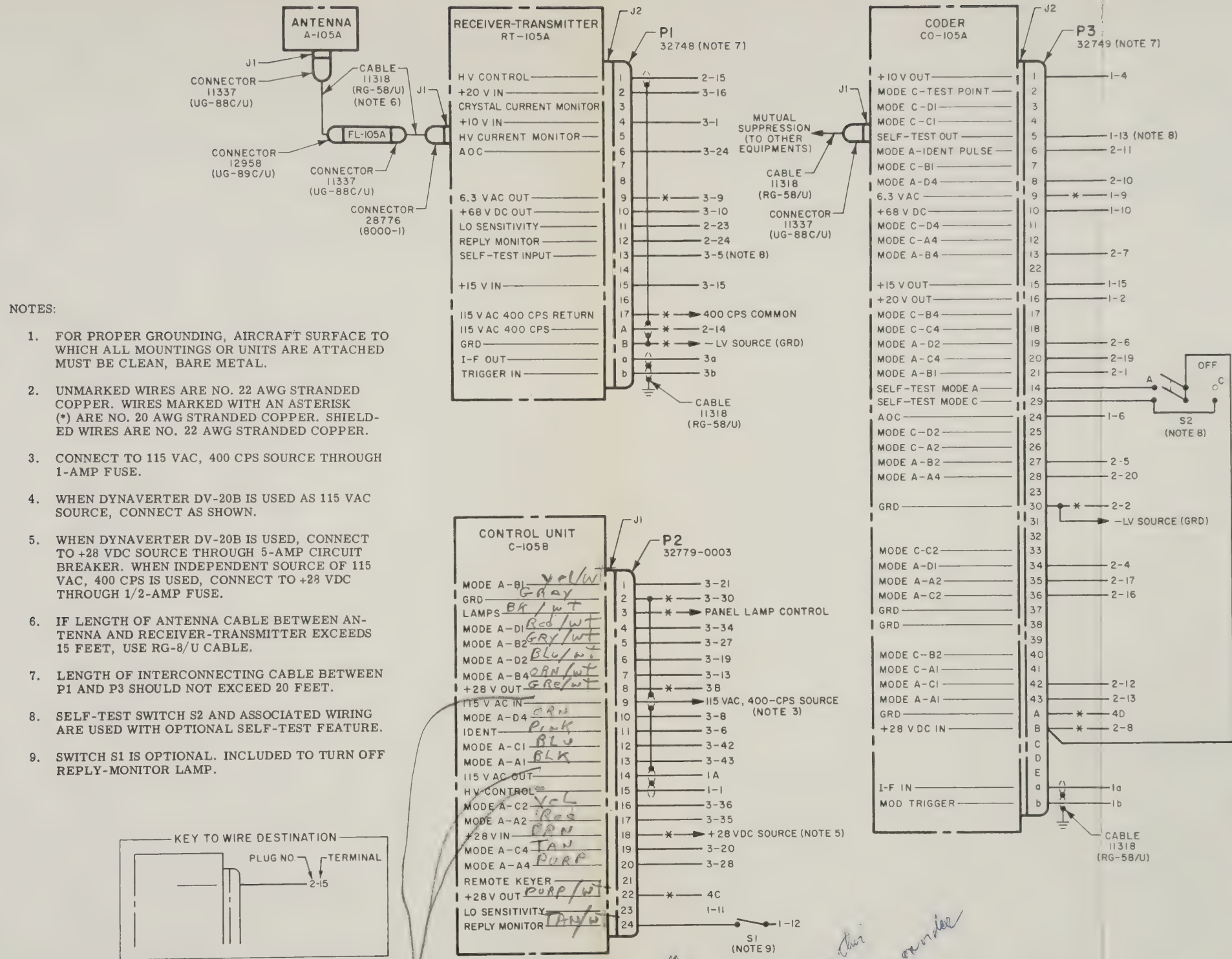


Figure 2-11. 105A ATC Transponder, Interconnection Diagram

SECTION III

OPERATION

3-1. OPERATING CONTROLS.

Operating controls for the transponder are located on the C-105B Control Unit. Operating controls for the transponder self-test feature are located on the self-test panel. All operating controls are illustrated in Figure 3-1. Table 3-1 lists the designations and describes the functions of the controls.

TABLE 3-1. OPERATING CONTROLS

Designation	Control	Function
C-105B CONTROL UNIT		
OFF-SBY-ON-LO	Function switch	Controls application of power to transponder and selects "low-sensitivity" function of the receiver.
—	Mode 3/A reply-code selector switches (4)	Select assigned Mode 3/A reply code.
—	Reply code indicator	Displays selected reply code.
ID	IDENT pulse selector switch	Selects IDENT pulse on command.
RPLY	Reply-monitor lamp	Provides visual indication of transponder operation.
SELF-TEST PANEL		
MODE A-C	Power control and mode selector switch	Turns on self-test feature, and selects mode of test signal applied to transponder.
RPLY ON-OFF	Reply-monitor lamp control switch	Turns off reply monitor lamp when reply monitor is not desired.

3-2. OPERATING PROCEDURES.

General. Except for power application, Mode 3/A reply code selection, and the selection on command of the IDENT pulse and the low-sensitivity function, operation of the transponder is automatic. The reply-monitor lamp provides a visual indication of operation.

Power Application. Turn the function switch to SBY, and wait approximately two minutes for the set to warm up. Turn the function switch to ON.

Note

If the function switch is turned directly to ON, the reply-monitor lamp will light until the time-delay relay is energized.

Turn the function switch to SBY while taxiing for take-off and after landing to eliminate undesirable interference and clutter on local radar displays.

Mode 3/A Reply Code Selection. Using the four reply-code selector switches, select the assigned code on the reply code indicator. Until the expanded (4096) code system has been incorporated at most ATCRBS, the reply code will consist of only two numbers. Select these numbers with the "thousands" and "hundreds" selector switches. Set the "tens" and "units" switches to select 0. For example, assigned code 36 will read 3600 on the reply code indicator; code 06 will read 0600 on the indicator.

IDENT Pulse Selection. When instructed by the controller to "squawk ident," momentarily depress the ID switch button. The IDENT pulse will be transmitted with the Mode 3/A reply for 15 to 30 seconds.

Low-Sensitivity Selection. When instructed by the controller to "squawk low," set the function switch to LO. The sensitivity of the receiver will be reduced.

Note

The transponder should be operated at normal sensitivity (function switch set to ON) except when the controller specifically requests low sensitivity.

Self-Test Operation.

Step 1. Apply power to transponder set and wait two minutes for the equipment to warm up.

Step 2. Set self-test RPLY ON-OFF switch to ON.

Step 3. Hold MODE A-C switch in A position. Reply-monitor lamp should light.

Step 4. Hold MODE A-C switch in C position. Reply-monitor lamp should light.

Note

The RPLY ON-OFF switch on the self-test panel interrupts the monitor signal to the reply-monitor lamp. It does not control the application of power to the self-test feature. The switch should be set in the ON position except when the reply-monitor indication is not desired.

3-3. OPERATING LIMITATIONS.

The transponder is designed to operate only to an altitude of 30,000 feet. If the aircraft is operated at altitudes over 30,000 feet, the transponder should be turned off to prevent high-voltage arcing in the transmitter cavity. Reliable operation cannot be expected beyond line-of-sight range so that high altitude is required for long range operation.

Aircraft Altitude (feet)	Range in Nautical Miles
1,000	40
5,000	80
10,000	115
20,000	160
27,000	200

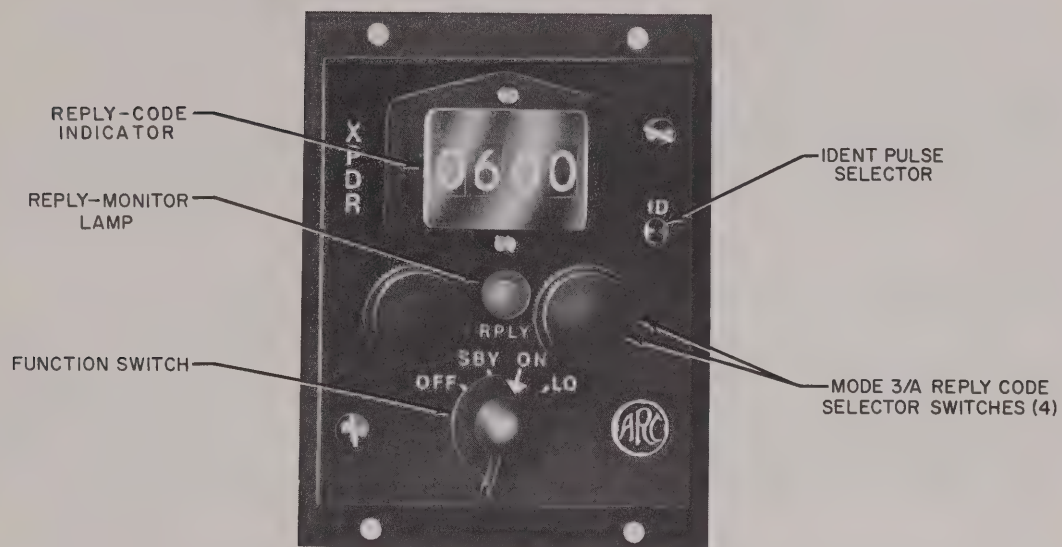


Figure 3-1. 105A ATC Transponder, Operating Controls

SECTION IV

PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

This section describes the principles of operation of the 105A ATC Transponder Set. The relationship of the units in the set is discussed, followed by a circuit description of each unit. The general operation of the transponder in the ATCRBS and reply code pulse identification and spacing are discussed in Section I.

4-2. OVER-ALL FUNCTIONAL DESCRIPTION.

Power Distribution. As shown in Figure 4-1, both the 28-volt dc and the 115-volt ac, 400 cps inputs are controlled by the function switch on the control unit. When the switch is set to SBY, ac is applied to one section of the power supply in the r-t unit to provide heater voltage for the electron tubes in the transponder set. When the switch is set to ON or to LO, ac is applied to both sections of the power supply in the r-t unit, and dc is applied to the regulated power supply in the coder. Operating voltages are distributed to the receiver-transmitter and the coder circuits. Power for the panel lamp is supplied from the aircraft panel light control.

Signal Distribution. Refer to Figure 4-1. When a 1030-mc interrogation signal is received by the transponder antenna, the signal is applied through the low-pass filter and the diplexer to the receiver r-f circuits in the r-t unit. The receiver uses a superheterodyne circuit to convert the 1030-mc input signal to a 60-mc i-f signal which is applied to i-f amplifier-detector assembly A1 in the coder unit. The detected video signal is applied to decoder assembly A2 as interrogation pulses.

The decoder circuits examine the time-space between the interrogation pulses to determine the mode of interrogation. The decoder then generates a main-gate trigger pulse to start the encoder circuit. It also applies a mode trigger pulse to the encoder gating circuits to enable the encoder to generate a selected reply code in the interrogation mode.

The Mode 3/A reply code is selected by the combined positions of the four code selector switches on the control unit. These switches control the presence or absence of the twelve information pulses in the pulse reply train. The IDENT pulse is selected by the ID switch on the control unit which completes the IDENT gating circuit in the encoder. When the function switch on the control unit is set to LO, the sensitivity of the receiver is reduced to limit the transponder replies.

The selected reply pulses from the encoder are applied to the transmitter as reply-pulse triggers. These triggers are converted to essentially rectangular pulses which are used to pulse-modulate the transmitter power oscillator. Output power pulses are coupled through the diplexer to the low-pass filter, where harmonics of the transmitter output frequency are suppressed. The 1090-mc reply signal is passed through the filter to the antenna for transmission. A sample of the power oscillator output is rectified by a monitor circuit to light the reply monitor lamp on the control unit.

4-3. RECEIVER CIRCUITS.

As shown in Figure 4-2, the r-f circuits of the transponder receiver are included in the receiver-transmitter, and the i-f and detector circuits are part of the coder unit. The 1030-mc interrogation signal from the antenna is applied through the filter and diplexer to preselector Z3. The preselector is triple-tuned to 1030 mc to provide image rejection and to protect the receiver from the 1090-mc transmitter signal. The output of Z3 is applied to mixer assembly Z4.

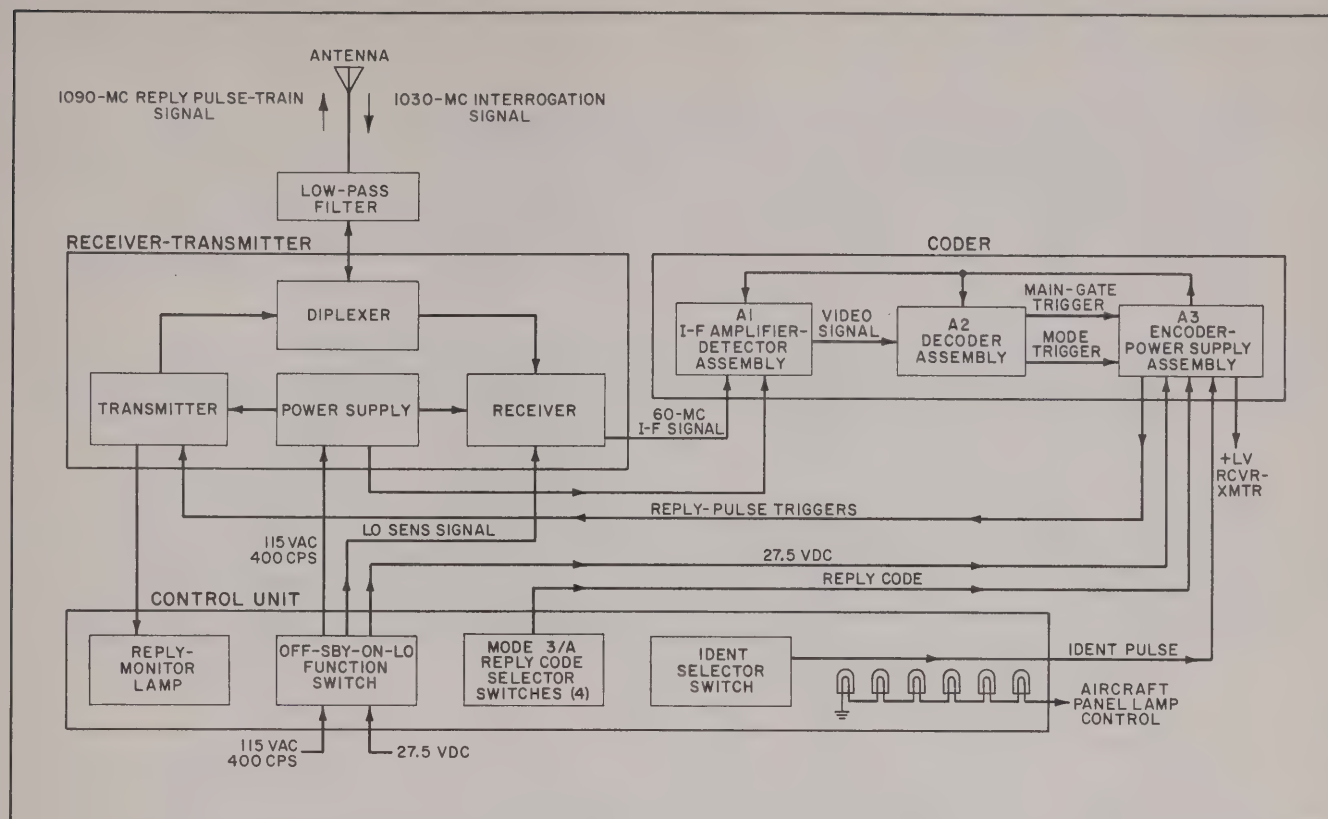


Figure 4-1. 105A ATC Transponder, Block Diagram

TP4181

Local oscillator cavity Z2, which contains receiver local oscillator V1, is tuned to 1090 mc to produce the local oscillator signal. The 1030-mc input signal from the preselector and the 1090-mc local oscillator signal are applied to mixer diode CR1 in mixer assembly Z4. They are heterodyned to produce a 60-mc difference signal, which is the receiver i-f frequency.

The 60-mc i-f frequency is amplified in 60-mc preamplifier Q1. When the low-sensitivity function is selected, the gain of Q1 is reduced by low-sensitivity switch Q5. The 60-mc output from Q1 is applied to assembly A1 in the coder unit.

In assembly A1, the i-f signal is amplified in five i-f amplifier stages (A1Q1, A1Q2, A1Q3, A1Q4, and A1V1). It is compressed in tunnel diode stages A1CR1 and A1CR2 to provide the desired amount of essentially instantaneous AGC. The i-f signal is detected by video detector A1CR3, and the detected video signal is amplified in video amplifiers A1Q5 and A1Q6 before it is applied to the input of decoder assembly A2.

When one of three AOC counters generates a desensitization signal (see paragraph 4-7), the signal from AOC amplifier A3Q4 is applied to AOC diode A1CR4. The output of A1CR4 is applied between the first and second video amplifiers to reduce the sensitivity of the receiver for the duration of the AOC pulse.

4-4. DECODER CIRCUITS.

As shown in Figure 4-3, the decoder circuits are contained on assembly A2 of the coder unit. The interrogation signal from the video amplifier in assembly A1 is applied to the pulse amplitude comparator circuit as pulses P1, P2, and P3. The amplitudes of P1 and P2 are compared to determine if the signal is from a main-lobe or a side-lobe of the interrogating transmission.¹ The resulting pulse signal (consisting of pulses P1 and

¹For signals from ground facilities transmitting only the directional interrogation pulse pair (P1 and P3) without the omnidirectional pulse (P2), no amplitude comparison can be made, and all interrogation signals are processed equally. Since ten ATCRBS currently have the P2 capability, the low-sensitivity function is incorporated to limit side-lobe replies.

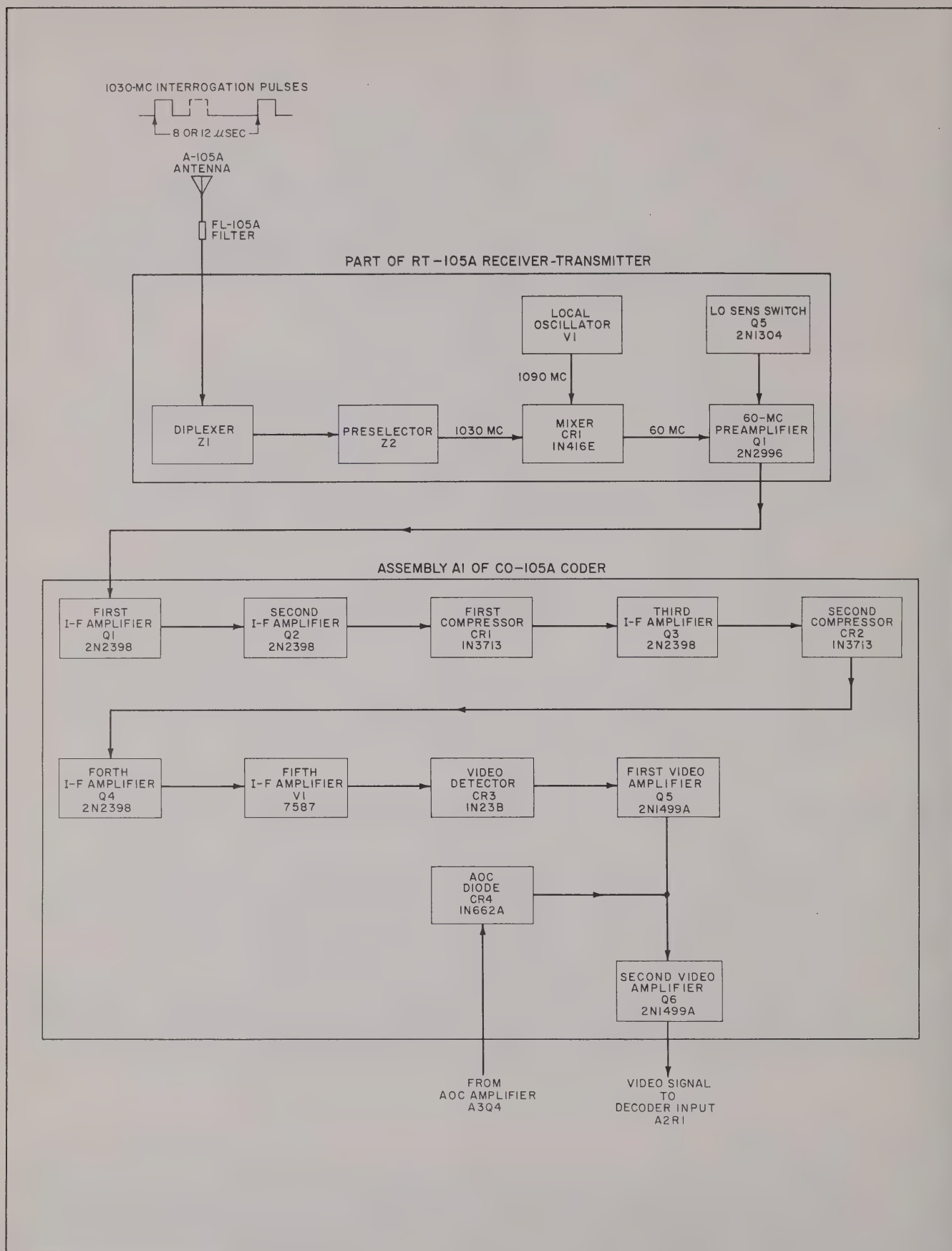


Figure 4-2. Receiver Circuits, Block Diagram

TP4287

P3, or pulses P1, P2, and P3) is amplified and applied to the delay line in the spike eliminator and SLS (side-lobe-suppression) gate circuit.

When a proper (main-lobe) interrogation has been received, the 2- μ sec gate of the spike eliminator and SLS gate circuit supplies an output trigger signal simultaneously to the Mode 3/A and the Mode C decoders. When a side-lobe interrogation which includes P2 has been received, the SLS gate supplies an output pulse to trigger the SLS gate generator. The SLS gate generator produces a suppression pulse which turns off the decoder input circuits for the 35- μ sec duration of the pulse. It also supplies a signal to the SLS AOC counter of the automatic overload control circuits for each trigger pulse.

In the Mode 3/A (8 μ sec) and Mode C (21 μ sec) decoders, the time space between the two pulses of the main-lobe trigger signal is examined to determine the mode of interrogation. When the space is 8 μ sec, the Mode 3/A decoder supplies a trigger pulse to the Mode 3/A diodes of the steering gates. When the space is 21 μ sec, the Mode C (21 μ sec) decoder supplies a trigger pulse to the Mode C diodes of the steering gates.

A main trigger pulse from the steering gates is applied to assembly A3 to start the encoder circuits. The steering gates also supply a mode signal to start the reply mode gate generator. The output of the reply mode gate generator is applied to the mode steering gates in the encoder to enable the encoder to accept a reply code of the interrogation mode. When the encoder has been started by a main trigger pulse, it generates a suppression signal which is returned to the decoder steering gates and pulse amplitude comparator circuit to turn off the decoder circuits for the duration of the transponder reply.

4-5. ENCODER CIRCUITS.

As shown in Figure 4-4, the encoder circuits are part of assembly A3 of the coder unit. A main trigger pulse from the decoder steering gates in assembly A2 is applied to the suppression and reply gate generator to in-

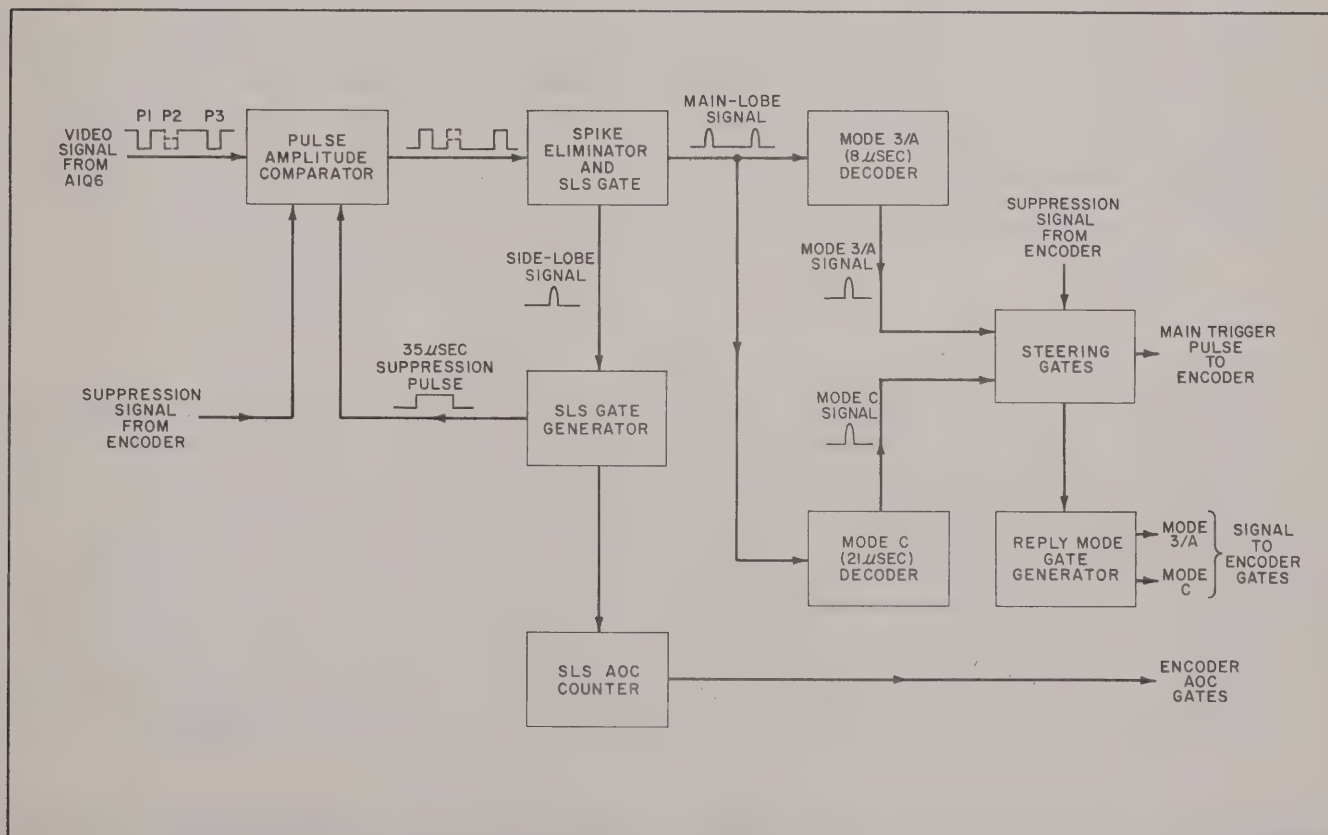


Figure 4-3. Decoder Circuits, Block Diagram

TP4289

itiate a transponder reply. The suppression and reply gate generator produces two separate pulse outputs, each of which has two functions. The 35- μ sec pulse output turns on the keyed oscillator, and is returned to the decoder input circuit to suppress the decoder for the duration of the transponder reply. The negative-going trigger pulse output is applied to the nine-stage counter and reply-pulse gates to start the counter, and to the decoder steering gates to turn them off.

The keyed oscillator supplies a 35- μ sec sine wave to the zero-cross detector. In the zero-cross detector circuit, a square pulse is developed each time the sine wave crosses the zero-reference point. These pulses are applied to a phase-inverter which develops two equal square-pulse outputs that are reversed 180° with respect to each other. The two outputs are applied to the A and B and the C and D coincidence gates to establish the position of the reply pulses in the pulse-reply train. A signal from the zero-cross detector is also applied to start the shift generator. The shift generator generates timing pulses which shift the counter stages of the nine-stage counter at proper intervals.

The externally selected reply codes (Mode 3/A and Mode C) are applied to the reply-pulse gates of the nine-stage counter and reply-pulse gates circuit. Reply pulse-trains for both modes are assembled and passed to the mode steering gates. Since the mode steering gates are controlled by the signals from the decoder reply mode gate generator, only the reply pulse-train signals for the interrogation mode are coupled through the mode steering gates to the A and B and the C and D coincidence gates.

The A and B coincidence gates establish the position of the A and the B reply-pulse groups in the reply pulse-train, and the C and D coincidence gates establish the position of the C and the D reply-pulse groups. The outputs of the coincidence gates are combined and converted to an amplified trigger pulse-train which is applied to the transmitter circuits in the receiver-transmitter.

4-6. TRANSMITTER CIRCUITS.

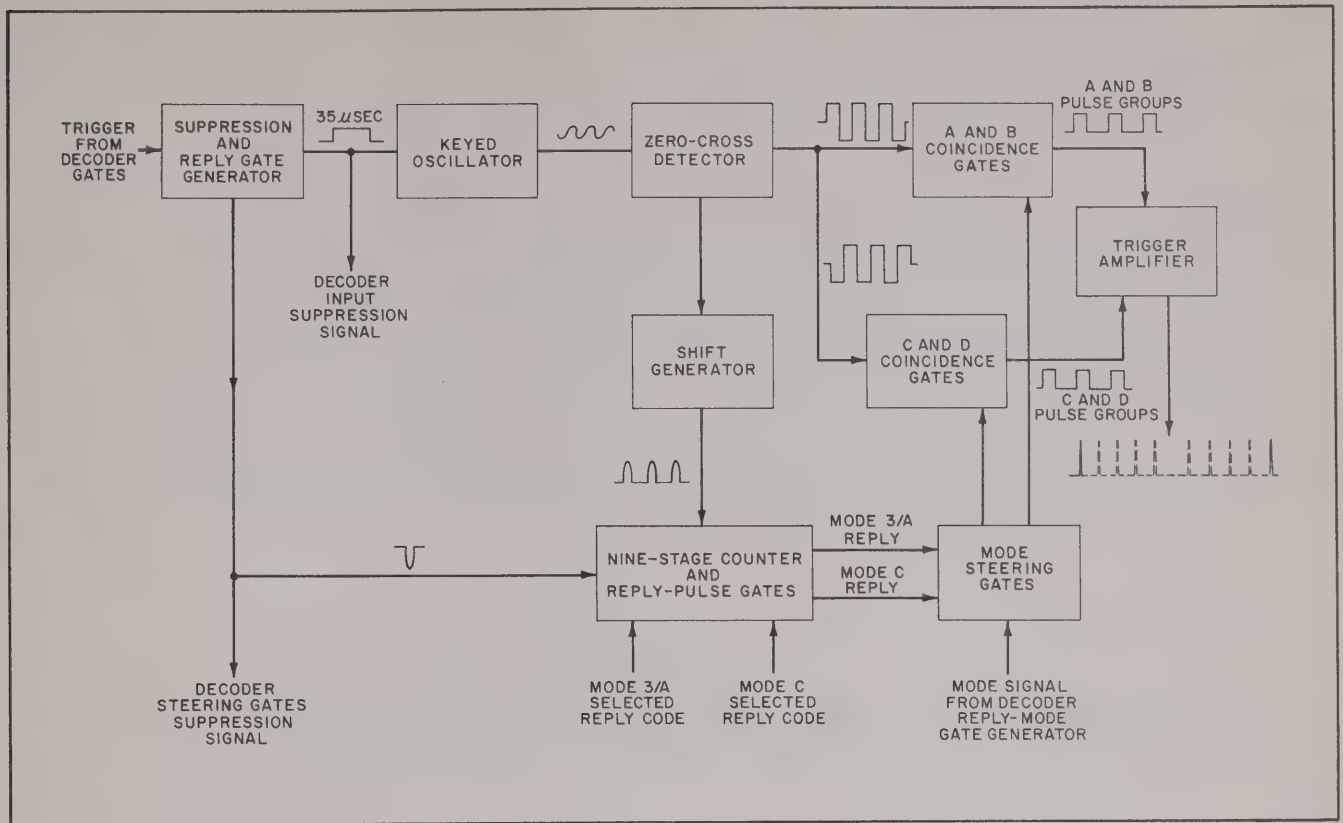
Refer to Figure 4-5. The reply-pulse triggers from the encoder are applied to trigger amplifier Q4 for amplification and inversion before being coupled to blocking oscillator Q3. In the blocking oscillator circuit, the reply-pulse triggers are converted to square output pulses. These pulses are coupled to modulator Q2, which applies the pulses as grid signals to power oscillator V2. A portion of the modulator output is also applied to the AOC counter (CR5, CR6), where each pulse signal is counted. Power oscillator V2 generates r-f energy in coded bursts according to the pulse signals to the grid. The r-f output pulses are coupled through the diplexer and the low-pass filter (where harmonics of the 1090-mc output frequency are removed) to the transponder antenna. A sample of the plate signal from V2 is applied through the reply-monitor circuit (CR22, CR23) to the reply-monitor lamp (DS7) in the control unit.

4-7. AUTOMATIC OVERLOAD CONTROL (AOC) CIRCUITS.

The AOC circuits automatically provide a low-sensitivity control for the transponder¹. The receiver sensitivity is limited when an excessive number of side-lobe interrogations are received, when the reply-rate exceeds the preset limit, or when the transmitter output tube exceeds its .01 duty cycle. As shown in Figure 4-6, the circuits consist of three diode counter stages with emitter-follower couplers, an AOC amplifier, and an AOC diode. (See Figures 6-1, 6-5, 6-7, and 6-9). The counter stages are voltage-doubler-rectifiers which integrate the dc pulses and currents to an average voltage. The number, rather than the frequency, of the pulses are counted. All three of the emitter-follower couplers (A3Q5, A3Q6, and A3Q7) and the AOC amplifier (A3Q4) are biased off until an output pulse from one of the counter circuits turns on the discrete coupler and supplies a pulse to the AOC amplifier. The output signal from the AOC amplifier is applied to AOC diode A1CR4 in the video amplifier circuit. The dc component through A1CR4 is blocked by capacitors A1C43 and A1C44, and is fed to ground through resistor A1R43. Since capacitor A2C68 provides an ac ground for diode A1CR4, the AOC diode presents a dynamic ac impedance which is inversely a function of the current through the diode. A1CR4 acts as an ac shunt across the video gain path of the video amplifier, and attenuates the video signal.

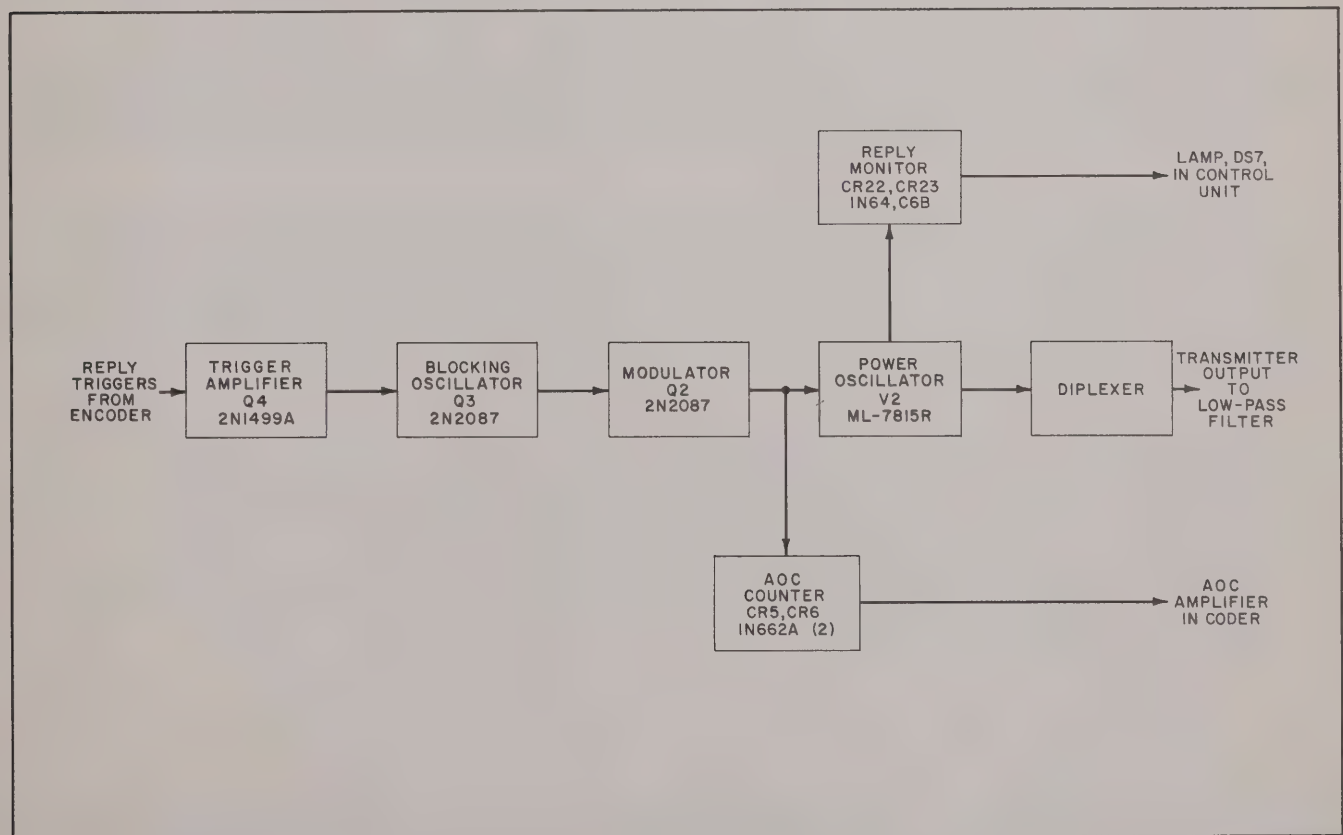
The SLS AOC counter circuit provides a desensitizing voltage when between 3,000 and 4,000 SLS/sec are received. The amount of sensitivity reduction is such that no more than 5,000 SLS/sec can be produced. Each

¹Not to be confused with the low-sensitivity function which is manually selected.



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Figure 4-4. Encoder Circuits, Block Diagram



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Figure 4-5. Transmitter Circuits, Block Diagram

time the decoder SLS gate generator is triggered, a negative-going pulse is applied through emitter-follower A2Q13 to the SLS AOC counter. The time-constants of the counter R-C circuits are selected so that the established number of side-lobe pulses must be received before capacitor A2C16 is fully charged. When A2C16 is fully charged, an output signal from the counter turns on emitter-follower A3Q7 and is coupled to the AOC amplifier. Diode A2CR10 provides temperature stabilization for transistor A2Q13.

The number of transponder replies required to initiate a trigger from the reply-rate AOC counter can be varied by the setting of resistor A3R17. Normally, the reply-rate control is set for 1200 replies per second. Each time the suppression and reply gate generator is turned on to initiate a transponder reply, the 35- μ sec square-pulse output from emitter-follower A3Q3 is coupled through emitter-follower A3Q8 to the reply-rate AOC counter. When more than 1200 replies per second are counted, an output signal is supplied to turn on emitter-follower A3Q6 and the AOC amplifier. Diode A3CR4 and A3CR5 are clamp diodes which hold the reply-rate counter at a fixed potential.

The transmitter AOC counter counts the number of individual pulses in the reply pulse-trains applied per second to the transmitter output tube. Since the output tube has an .01 duty cycle limitation, the counter supplies a limiting signal through emitter-follower A3Q6 when more than 18,000 pulses per second are transmitted.

4-8. POWER SUPPLIES.

General. The transponder set uses two input voltages and two power supplies to produce the various voltages required for transponder operation. A function switch in the control unit controls the application of the input voltages. A high-voltage power supply is housed in the receiver-transmitter, and a regulated power supply is part of assembly A3 in the coder unit.

High-Voltage Power Supply. See Figure 6-1. The high-voltage power supply uses two transformers and associated diode-rectifier circuits to convert the 115-volt ac, 400 cps input to +1800, +68, +39, and -82 volts dc, and to 6.3 and 6.0 volts ac. When the function switch is set to SBY, 115 volts ac, 400 cps is applied to the input of transformer T2. Transformer T2 has three output windings. The output of winding 3-4 is rectified by a bridge rectifier (diodes CR12—CR15) to produce the +68 and +39 dc voltages for the receiver electron tube plate supplies and for the transmitter blocking oscillator. The output of winding 5-6 is rectified by a bridge rectifier (diodes CR16—CR19) to produce the -82 volts dc for the transmitter modulator circuit. Output winding 7-9 and tap 7-8 provide the 6.3 and 6.0 volts ac for the electron tube and relay K1 heater circuits.

When the function switch is set to ON or LO, the 115 volts ac, 400 cps is applied to the input of transformer T2, and to relay K1. Relay K1 is a thermal relay with a 75-second time delay which prevents the application of high voltage to the transmitter output tube until the tube has reached the proper operating temperature. When relay K1 is energized, the 115 volts ac, 400 cps is applied to transformer T3. The output of transformer T3 is rectified by diodes CR20 and CR21 to produce the +1800-volt dc plate supply for the transmitter output tube.

Regulated Power Supply. See Figure 6-9. The regulated power supply uses a transistor and four Zener diode circuits to convert the +28-volt dc input to +20, +15, +10, +5, and 0 to +.2, variable, dc voltages. When the function switch is set to ON or to LO, +28 volts dc is applied through coupling diode A3CR13 to the collector circuit of transistor A3Q22. An output voltage of +20 volts dc is taken from the emitter of A3Q22. The +28-volt input is dropped and regulated across Zener diodes CR9—CR12 to produce +15, +10, and +5 dc output voltages. The low-voltage outputs are distributed to the transistor circuits in the transponder set. A portion of the +5-volt output is applied through variable resistors A3R63 and A3R64 to produce outputs of 0 to +0.2 volt dc for the tunnel diode compressor circuits.

4-9. SELF-TEST FEATURE.

The self-test feature consists of an assembly which generates pulses to self-test the transponder circuits, and a control switch which selects the mode of the test pulses. The output of the self-test circuit is applied to the

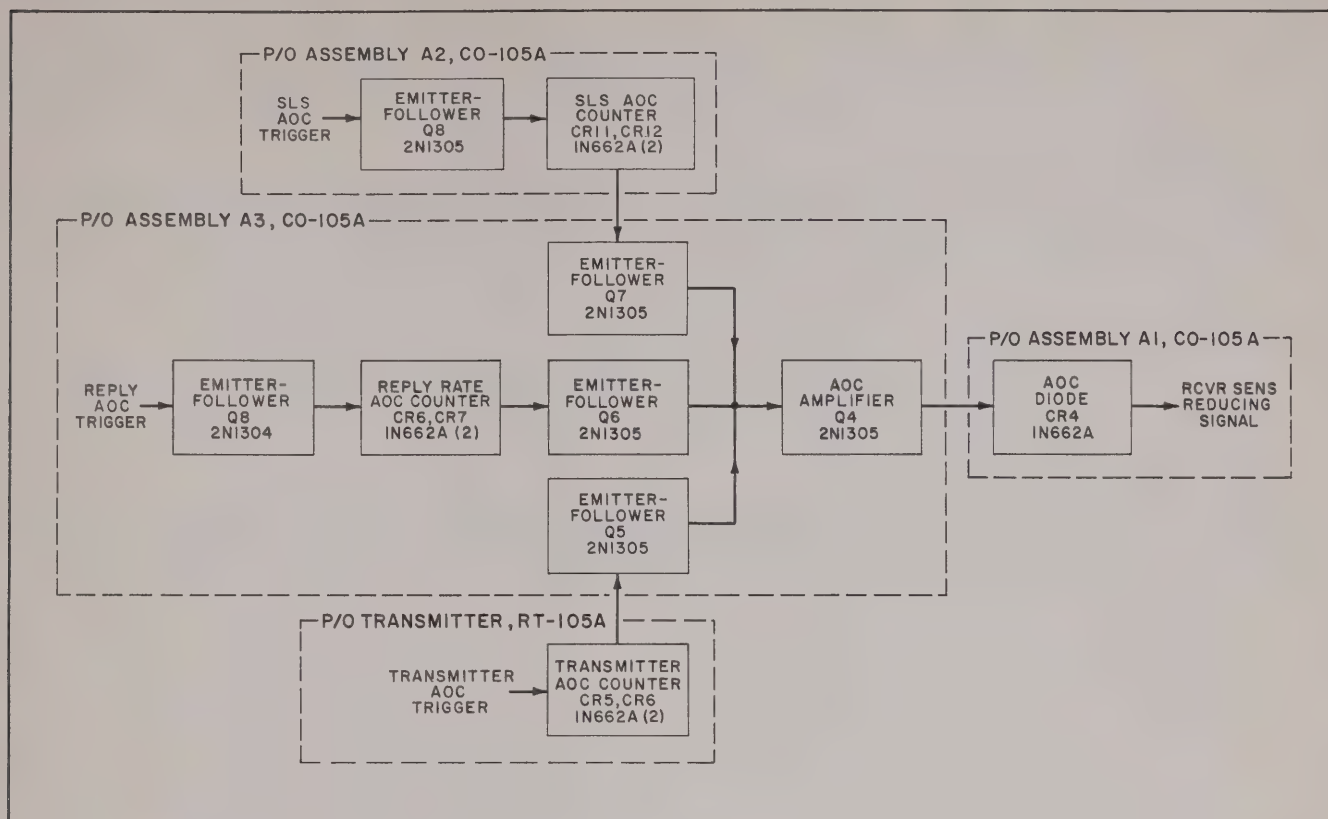


Figure 4-6. AOC Circuits, Block Diagram

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plate circuit of receiver local oscillator V1 to activate the transponder. Indication of transponder operation is displayed by the reply monitor lamp on the control unit. An on-off switch, also part of the self-test control panel, interrupts the reply monitor lamp circuit when the indicator is not desired.

Refer to Figure 6-11. When power from the Mode A/C control switch is applied to the self-test circuit, the rate generator supplies a starting pulse to the output width multivibrator and to the Mode A/C delay multivibrator. The output pulse from the output width multivibrator is applied to the output pulse amplifier as pulse P1 of an interrogation signal. Eight or twenty-one microseconds later (depending on the selected mode), the Mode A/C delay multivibrator supplies a second starting pulse to the output width multivibrator. A second pulse from the output width multivibrator is applied to the output pulse amplifier as pulse P3 of an interrogation signal. The two-pulse output of the output pulse amplifier is coupled to the plate circuit of tube V1 in the receiver-transmitter.

SECTION V

MAINTENANCE

5-1. INTRODUCTION.

This section contains interim maintenance information for the 105A ATC Transponder. It includes replacement and disassembly procedures, alignment and adjustment procedures, and typical measurements. Schematic and wiring diagrams are included in Section VI.

WARNING

VOLTAGES USED IN THE RECEIVER-TRANSMITTER MAY BE
FATAL IF CONTACTED. OBSERVE ALL SAFETY PRECAUTIONS.

5-2. TEST EQUIPMENT AND ACCESSORIES.

Table 5-1 lists the test equipment and accessories required for maintenance of the 105A ATC Transponder. Equivalent test equipment may be substituted. Interconnecting cables are fabricated as required from RG-58/U coaxial cable and suitable connectors, unless otherwise noted.

TABLE 5-1. TEST EQUIPMENT AND ACCESSORIES

Qty	Name	Designation or Characteristics
1	Attenuator, 30 db	Empire Devices Model AT50
1	Attenuator, 10 db	Empire Devices Model AT57
1	Attenuator	Hewlett-Packard Model 355C
1	Attenuator	Hewlett-Packard Model 355D
1	Audio Oscillator	Hewlett-Packard Model 200CD
1	Cable Harness	(See Figure 5-3)
1	Cable, Microdot (7-1/4 inches)	(Fabricated from Surprenant Type 9522 Cable and 2 Microdot No. 3223 Connectors)
1	Modulator	Collins Radio Model 578X-1
1	Navigation Aid Test Set	Boonton Radio Type 235A
1	Oscilloscope	Dumont Model 304A
1	Oscilloscope	Tektronix Model 545
1	Preamplifier Matching Network	(See Figure 5-8)
1	Resistor	50 ohms
1	Resistor	1000 ohms
1	R-f Voltmeter	Boonton Electronics Model 91D
1	Signal Generator	Aircraft Radio Model H-12
1	Signal Generator	Hewlett-Packard Model 608D
1	Sweep Frequency Generator	Jerrold Electronics Model 900A
1	Voltmeter	Ballantine Model 300D
1	Voltmeter	Hewlett-Packard Model 412A

5-3. REMOVAL AND REPLACEMENT PROCEDURES.

General. The receiver-transmitter and the coder are enclosed in dust covers secured by a Dzus fastener at the rear of each unit. When the receiver-transmitter dust cover is removed, all parts except the 60-mc pre-amplifier, relay K1, and diode CR10 are exposed.

CAUTION

Diplexer Z1, preselector Z3, mixer Z4, receiver oscillator cavity Z2, transmitter oscillator cavity Z5, and cables W1 through W5 in the receiver-transmitter are matched during factory assembly. When any of these assemblies is altered or replaced, the receiver or the transmitter frequency may be shifted, and the circuits may require retuning.

In the coder, printed-circuit board assemblies A2 and A3 form the sides of the unit. A2 is hinged at the rear of the chassis and held with eight screws. When the screws are removed, A2 can be swung away to expose the coder parts. A1 is secured to the floor of the chassis by four screws. When the screws are removed, A1 may be moved and serviced without disconnecting the wiring.

Removal of 60-mc Preamplifier. The 60-mc preamplifier is accessible through the opening in the top of the r-t chassis. To remove the 60-mc preamplifier, refer to Figures 6-2 and 6-3, and proceed as follows:

- Step 1. Disconnect plug P9 from connector J9.
- Step 2. Unsolder the interconnecting wiring from the 60-mc preamplifier (Figure 6-2).
- Step 3. Remove the four screws that hold the preamplifier in the assembly shield.
- Step 4. Lift the 60-mc preamplifier out through the opening in the top of the r-t chassis.

Replacement of Electron Tubes. The transponder set uses three plug-in electron tubes. In the receiver-transmitter, tube V1 (type 8058) is contained in receiver local oscillator cavity Z2, and tube V2 (type ML-7815R) is contained in the transmitter power oscillator cavity, Z5. In the coder, tube A1V1 (type 7587) is part of assembly A1 (Figure 5-2).

To replace V1, refer to Figure 5-1 and proceed as follows:

- Step 1. Remove four flat head screws that secure cavity to chassis. Gently lift cavity from chassis.
- Step 2. Unscrew three screws that hold heater-input end plate and remove end plate.
- Step 3. Remove electron tube from cavity and insert replacement tube.
- Step 4. Reassemble and reinstall cavity.
- Step 5. Check output of Z2 (refer to paragraph 5-5).

To replace V2, refer to Figure 5-1, and proceed as follows:

- Step 1. Unsolder lead from B+ input terminal on cavity Z5.
- Step 2. Remove six flat head screws that secure cavity to chassis. Move cavity from chassis.
- Step 3. Unscrew B+ end cap from cavity.
- Step 4. Remove V2 from cavity and install replacement tube.
- Step 5. Reassemble and reinstall cavity.
- Step 6. Check output frequency of Z5 (refer to paragraph 5-4).

To replace A1V1, refer to Figure 5-2 and proceed as follows:

- Step 1. Remove A1 from coder.
- Step 2. Remove six screws that secure shield and remove shield.
- Step 3. Lift off plate ring from A1V1 and remove tube from socket.
- Step 4. Install replacement tube, restore plate ring, and reinstall A1.

Replacement of Transistors. Table 5-2 lists the reference designation, type, function, and locating diagram for each transistor. All transistors are soldered in position. Some are mounted on insulators to protect them against excessive heat during the soldering operation. When soldering a transistor not mounted on an insulator, hold the transistor leads with a pair of pliers between the solder joint and the transistor to form a heat sink. Do not remove the pliers until the heat from the solder joint has been dissipated.

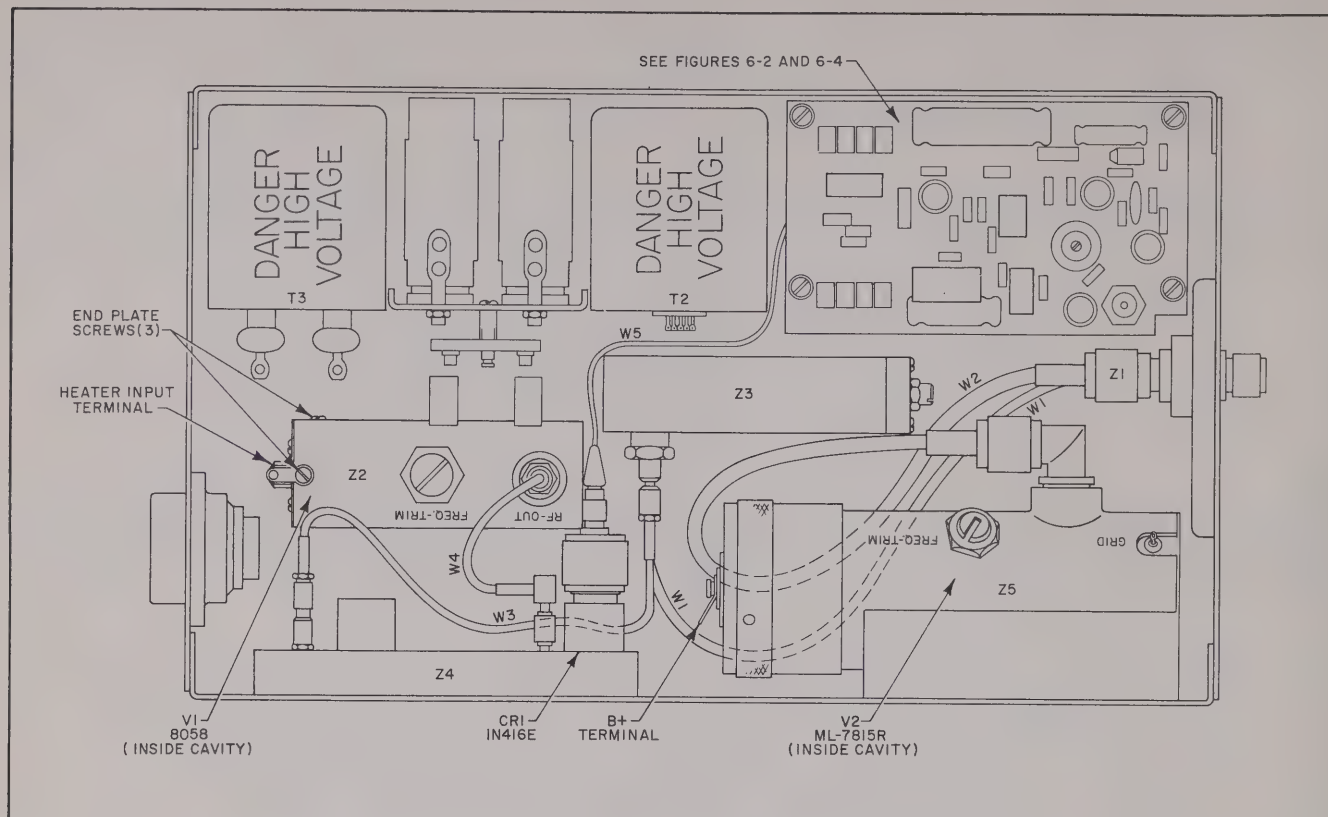


Figure 5-1. RT-105A Receiver-Transmitter, Tube and Diode Location Diagram

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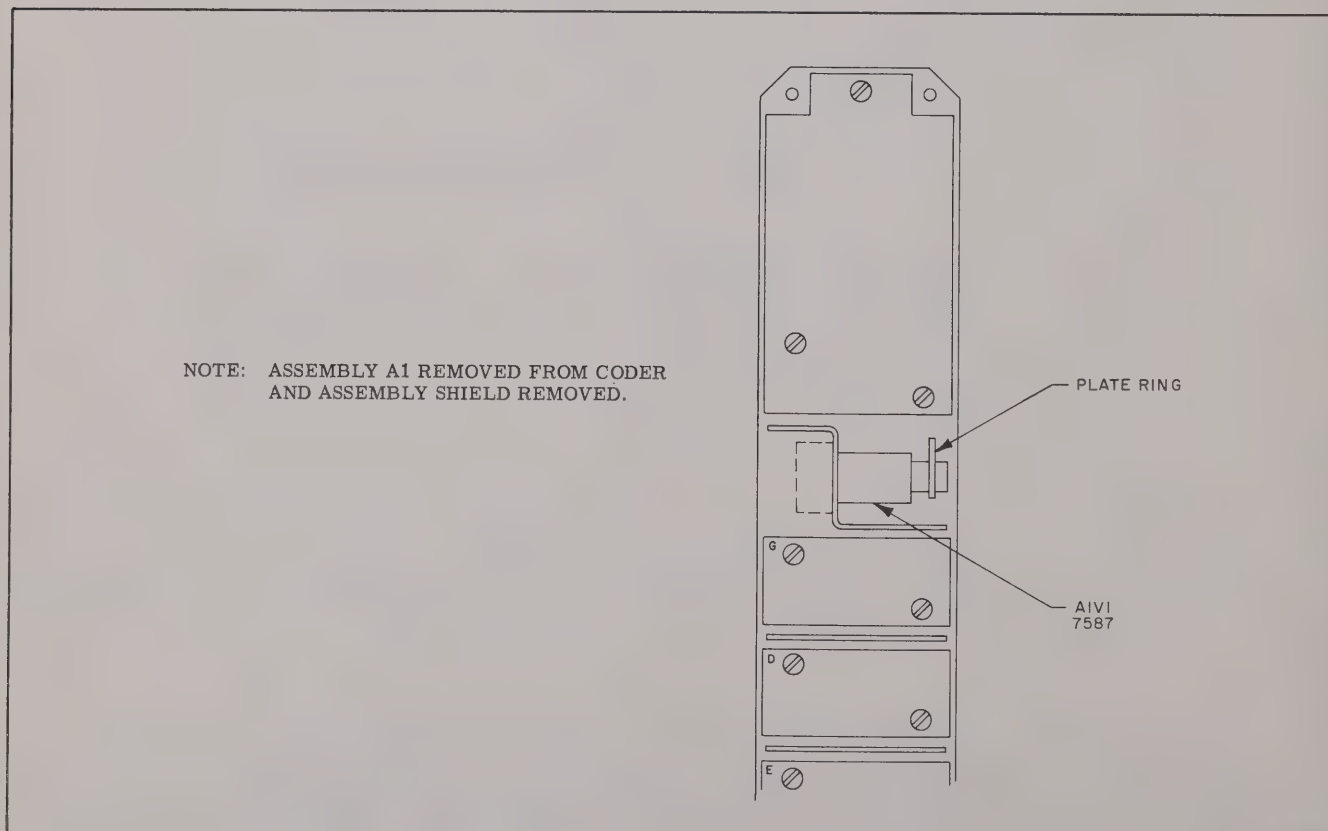


Figure 5-2. CO-105A Coder, Tube Location Diagram

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TABLE 5-2. TRANSISTOR DATA

Ref Desig	Type	Function	Figure No.	
RECEIVER-TRANSMITTER				
Q1	2N2996	60-mc Preamplifier	6-3	
Q2	2N2087	Modulator	6-4	
Q3	2N2087	Blocking Oscillator	6-4	
Q4	2N1499A	Trigger Amplifier	6-4	
Q5	2N1304	Low-sensitivity Switch	6-4	
CODER, ASSEMBLY A1				
A1Q1	2N2398	First I-f Amplifier	6-6	
A1Q2	2N2398	Second I-f Amplifier	↑	
A1Q3	2N2398	Third I-f Amplifier		
A1Q4	2N2398	Fourth I-f Amplifier	↓	
A1Q5	2N1499A	First Video Amplifier		
A1Q6	2N1499A	Second Video Amplifier	6-6	
CODER, ASSEMBLY A2				
A2Q1	2N1499A	First Video Amplifier	6-8	
A2Q2	2N706M	Second Video Amplifier	↑	
A3Q3	2N1499A	Gated Amplifier		
A3Q4	2N1499A	Suppressor Gate	↑	
A3Q5	2N711	0.3-μsec Gate		
A3Q6	2N711	First 0.2-μsec Gate	↑	
A2Q7	2N1499A	Second 0.2-μsec Gate		
A2Q8	2N1499A	SLS Gate	↑	
A2Q9	2N1304	Main-lobe Signal Emitter-follower		
A2Q10	2N706A }	SLS Multivibrator	↑	
A2Q12	2N585 }			
A2Q11	2N585	Fast Recovery Switch	↑	
A2Q13	2N1305	AOC Emitter-follower		
A2Q14	2N706A }	“Main” 8-μsec Multivibrator	↑	
A2Q16	2N706A }			
A2Q15	2N1304	Fast Recovery Switch	↑	
A2Q17	2N706A	“Main” 8-μsec Amplifier		
A2Q18	2N1499A }	8-μsec Coincidence Gates	↑	
A2Q19	2N711 }			
A2Q20	2N1499A }			
A2Q21	2N1304	Mode 3/A Emitter-follower	↑	
A2Q22	2N706A }	“Back-up” 8-μsec Multivibrator		
A2Q24	2N706A }			
A2Q23	2N1304	Fast Recovery Switch	↑	
A2Q25	2N706A	“Back-up” 8-μsec Amplifier		
A2Q26	2N706A }	“Main” 21-μsec Multivibrator	↑	
A2Q28	2N706A }			
A2Q27	2N1304	Fast Recovery Switch	↑	
A2Q29	2N706A	“Main” 21-μsec Amplifier		
A2Q30	2N1499A }	21-μsec Coincidence Gates	↑	
A2Q31	2N711 }			
A2Q32	2N1499A }			
A2Q33	2N1304	Mode C Emitter-follower	↑	
A2Q34	2N706A }	“Back-up” 21-μsec Multivibrator		
A2Q36	2N706A }			
A2Q35	2N1304	Fast Recovery Switch	↑	
A2Q37	2N706A	“Back-up” 21-μsec Amplifier		
A2Q38	2N585 }	Reply Mode Multivibrator	↓	
A2Q39	2N585 }		6-8	

TABLE 5-2. TRANSISTOR DATA - Continued

Ref Desig	Type	Function	Figure No.
CODER, ASSEMBLY A3			
A3Q1	2N585 }	Suppression and Reply-gate Multivibrator	<div>6-10</div> <div>↑</div> <div>↓</div> <div>6-10</div>
A3Q2	2N706A }		
A3Q3	2N706A	Suppression Coupler	
A3Q4	2N1305	AOC Amplifier	
A3Q5	2N1305	Transmitter-overload Emitter-follower	
A3Q6	2N1305	Reply-rate AOC Emitter-follower	
A3Q7	2N1305	SLS AOC Emitter-follower	
A3Q8	2N1304	AOC Emitter-follower	
A3Q9	2N706A	Keyed Oscillator	
A3Q10	2N1499A }	Zero-cross Detectors	
A3Q11	2N1499A }		
A3Q12	2N1499A	Zero-cross Amplifier	
A3Q13	2N706A	Phase Inverter	
A3Q14	2N706A	Shift-pulse Generator	
A3Q15	2N1499A }	C and D Coincidence Gates	
A3Q16	2N711 }		
A3Q17	2N1499A }		
A3Q18	2N1499A }		
A3Q19	2N711 }	A and B Coincidence Gates	
A3Q20	2N1499A }		
A3Q21	2N706A	Trigger Amplifier	
A3Q22	2N657A	Voltage Regulator	
A3Q23	2N585 }	First Counter Stage	
A3Q24	2N1499A }		
A3Q25	2N585 }	Second Counter Stage	
A3Q26	2N1499A }		
A3Q27	2N585 }	Third Counter Stage	
A3Q28	2N1499A }		
A3Q29	2N585 }	Fourth Counter Stage	
A3Q30	2N1499A }		
A3Q31	2N585 }	Fifth Counter Stage	
A3Q32	2N1499A }		
A3Q33	2N585 }	Sixth Counter Stage	
A3Q34	2N1499A }		
A3Q35	2N585 }	Seventh Counter Stage	
A3Q36	2N1499A }		
A3Q37	2N585 }	Eighth Counter Stage	
A3Q38	2N1499A }		
A3Q39	2N585 }	Ninth Counter Stage	
A3Q40	2N1499A }		
CODER, ASSEMBLY A4 (Optional)			
A4Q1	2N1304 }	Rate Generator	<div>6-12</div> <div>↑</div> <div>↓</div> <div>6-12</div>
A4Q2	2N1304 }		
A4Q3	2N706A }	Mode A/C Delay Multivibrator	
A4Q5	2N706A }		
A4Q4	2N1304	Fast Recovery Switch	
A4Q6	2N706A }	Output-width Multivibrator	
A4Q8	2N706M }		
A4Q7	2N1304	Fast Recovery Switch	
A4Q9	2N2087	Output Pulse Amplifier	

Replacement of Crystal Diodes. Table 5-3 lists the reference designation, type, function, and locating diagram for each diode. Except for CR1 in the receiver-transmitter and A1CR3 in the coder, all crystal diodes are soldered in position. If a soldered-in diode must be replaced, the new diode must be polarized correctly, and the leads routed as nearly as possible like the original installation. When soldering a diode, hold the lead

with a pair of pliers between the solder joint and the diode to form a heat sink. Do not remove the pliers until the heat from the solder joint has been dissipated.

To replace CR1 in the receiver-transmitter, disconnect cable W5 from mixer assembly Z4 (see Figure 5-1). Lift out CR1 and install the replacement crystal.

To replace A1CR3 in the coder unit, remove assembly A1 and then remove its shield. See Figure 6-6. Remove the coil-spring contact from the cathode of A1CR3 and slide the diode from the mounting clip. Install the replacement diode and reconnect the cathode contact.

TABLE 5-3. CRYSTAL DIODE DATA

Ref Desig	Type	Function	Figure No.
RECEIVER-TRANSMITTER			
CR1	1N416E	Mixer	5-1
CR2	1N662A	Transient Suppressor	6-4
CR3	1N662A	Pulse Coupler	6-4
CR4	1N662A	Current Shunt	6-4
CR5	1N662A }	AOC Counter Diodes	6-4
CR6	1N662A }		
CR7	1N662A	Current Shunt	6-4
CR8	1N662A	Trigger Coupler	6-4
CR9	ZA39A	+39-volt Zener Diode	6-4
CR10	1N4038B	+68-volt Zener Diode	6-2
CR11	ZD82A	-82-volt Zener Diode	6-4
CR12—CR15	1N2070(4)	Bridge Rectifier	6-4
CR16—CR19	1N2070(4)	Bridge Rectifier	6-4
CR20	D1530LS	+1800-volt Rectifier	6-2
CR21	D1530LS	+1800-volt Rectifier	6-2
CR22	1N64	Reply Detector	6-3
CR23	C6B	Reply-gate Silicon Control Rectifier	6-3
CR24	1N662A	Low-sensitivity Coupler	6-3
CODER, ASSEMBLY A1			
A1CR1	1N3713	First Tunnel Diode Compressor	6-6
A1CR2	1N3713	Second Tunnel Diode Compressor	↑
A1CR3	1N238	Detector	↓
A1CR4	1N662A	AOC Coupling Diode	6-6
CODER, ASSEMBLY A2			
A2CR1	1N662A	Blocking Diode	6-8 ↑
A2CR2	1N662A	Pulse Smoother	
A2CR3	1N662A	Stabilizer	
A2CR4	1N662A	Suppressor Gate Diode	
A2CR5	1N662A	SLS Coupling Diode	
A2CR6	1N662A	Blocking Diode	
A2CR7	1N662A	Stabilizer	
A2CR8	1N662A	Stabilizer	
A2CR9	1N662A	Stabilizer	
A2CR10	1N662A	Stabilizer	
A2CR11, } A2CR12 }	1N662A(2)	AOC Counter Diodes	↓ 6-8
A2CR13	1N662A	Stabilizer	
A2CR14	1N662A	Blocking Diode	
A2CR15	1N662A	Stabilizer	
A2CR16	1N662A(2) }	OR-gate	
A2CR17	1N662A }		

TABLE 5-3. CRYSTAL DIODE DATA - Continued

Ref Desig	Type	Function	Figure No.
CODER, ASSEMBLY A3 - Continued			
A3CR29	1N662A	Mode 3/A Pulse D1 Gate	<div>6-10</div> <div>↑</div> <div>↓</div> <div>6-10</div>
A3CR30	1N662A	Mode C Pulse B1 Gate	
A3CR31	1N662A	Mode C Pulse D1 Gate	
A3CR32	1N662A	Mode 3/A Pulse B2 Gate	
A3CR33	1N662A	Mode 3/A Pulse D2 Gate	
A3CR34	1N662A	Mode C Pulse B2 Gate	
A3CR35	1N662A	Mode C Pulse D2 Gate	
A3CR36	1N662A	Mode 3/A Pulse B4 Gate	
A3CR37	1N662A	Mode 3/A Pulse D4 Gate	
A3CR38	1N662A	Mode C Pulse B4 Gate	
A3CR39	1N662A	Mode C Pulse D4 Gate	
A3CR40	1N662A	Mode 3/A Pulse F2 Gate	
A3CR41	1N662A	Mode C Pulse F2 Gate	
A3CR42	1N662A	Mode 3/A SPI Pulse Gate	
A3CR43	1N662A	Mode C Test Point	
A3CR44	1N662A	Mode 3/A A-B Bus Clamping Diode	
A3CR45	1N662A	Mode 3/A C-D Bus Clamping Diode	
A3CR46	1N662A	Mode C A-B Bus Clamping Diode	
A3CR47	1N662A	Mode C C-D Bus Clamping Diode	
A3CR48	1N662A	Mode 3/A A-B Bus Steering Gate	
A3CR49	1N662A	Mode 3/A C-D Bus Steering Gate	
A3CR50	1N662A	Mode C A-B Bus Steering Gate	
A3CR51	1N662A	Mode C C-D Bus Steering Gate	
A3CR52 } A3CR53 }	1N662A(2)	C-D Bus Mode OR-gate	
A3CR54 } A3CR55 }	1N662A(2)	A-B Bus Mode OR-gate	
CODER, ASSEMBLY A4 (Optional)			
A4CR1	1N662A	Stabilizer	<div>6-12</div> <div>↑</div> <div>↓</div> <div>6-12</div>
A4CR2	1N662A	Stabilizer	
A4CR3	1N662A	Blocking Diode	
A4CR4	1N662A	Isolation Diode	
A4CR5	1N662A	Blocking Diode	
A4CR6	1N662A	Blocking Diode	
A4CR7	1N662A	Stabilizer	
A4CR8	1N662A	Stabilizer	
A4CR9	1N662A	Stabilizer	

5-4. MEASUREMENT AND ADJUSTMENT OF TRANSMITTER OUTPUT FREQUENCY.

To measure and adjust the transmitter output frequency, proceed as follows:

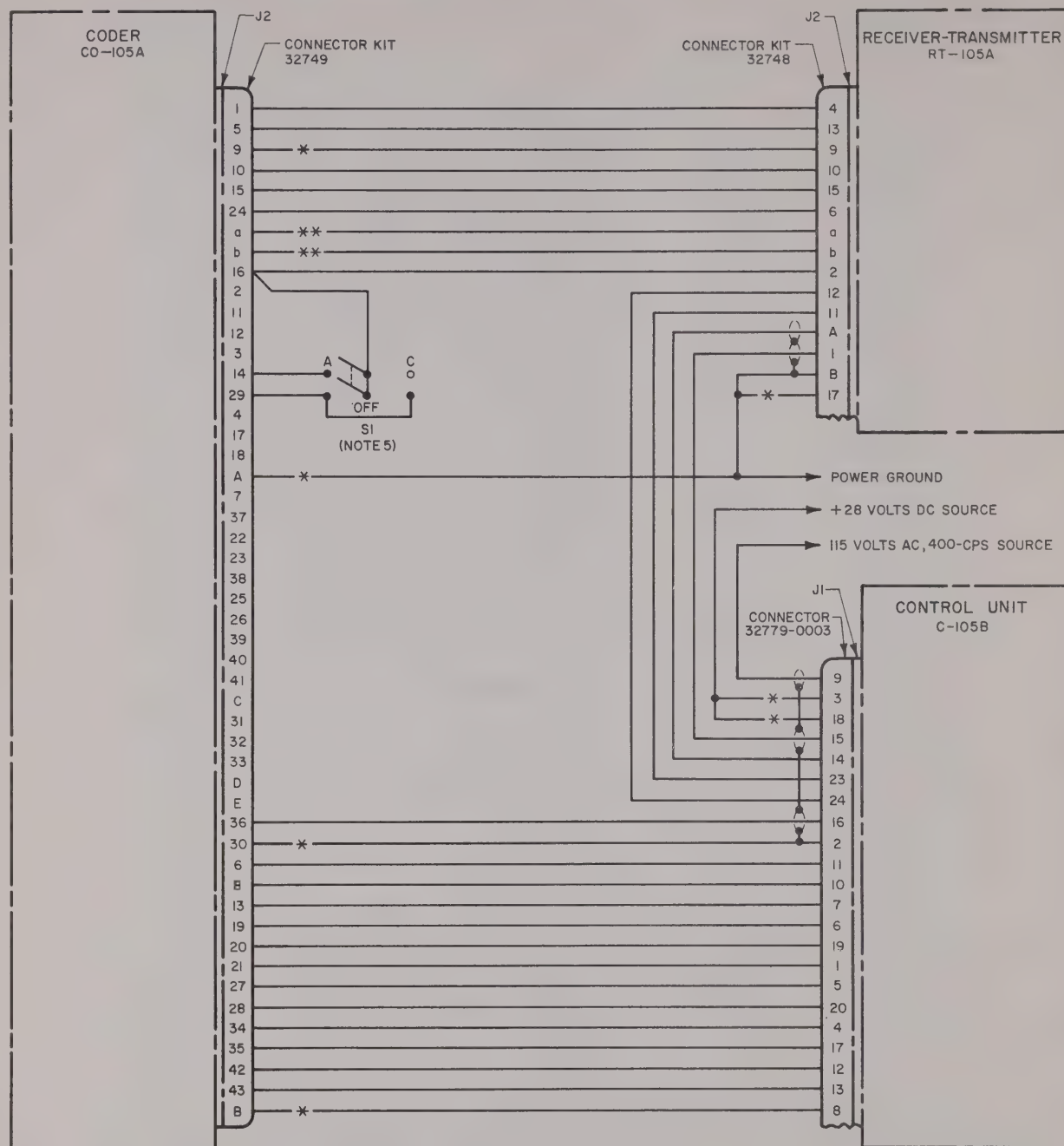
Step 1. Connect transponder set as shown in Figure 5-3, and connect transponder and test equipment as shown in Figure 5-4.

Step 2. Turn on Boonton Radio Navigation Aid Test Set Type 235A, and adjust it for frequency measurement.

Step 3. Turn on transponder and remaining test equipment, and allow equipment to warm up.

Step 4. Adjust FREQ MEAS control of 235A for a maximum indication on panel meter. Frequency-measure (MC) dial should indicate 1090 mc.

Step 5. If necessary, alternately vary FREQ TRIM screws on cavity Z5 for a 1090-mc indication on 235A.



NOTES:

1. UNMARKED WIRES ARE NO. 22 AWG STRANDED COPPER, INSULATED.
2. WIRES MARKED WITH ASTERISK (*) ARE NO. 20 AWG STRANDED COPPER INSULATED.
3. WIRES MARKED $\frac{1}{2}$ ARE NO. 22 AWG STRANDED COPPER, INSULATED, SHIELDED.
4. WIRES MARKED WITH DOUBLE ASTERISK (**) ARE COAXIAL CABLE R5-58/U.
5. SWITCH S1 IS DOUBLE-POLE, DOUBLE THROW, MOMENTARY CONTACT TOGGLE SWITCH USED WITH OPTIONAL SELF-TEST FEATURE ONLY.

Figure 5-3. 105A ATC Transponder, Bench Test Interconnection Diagram

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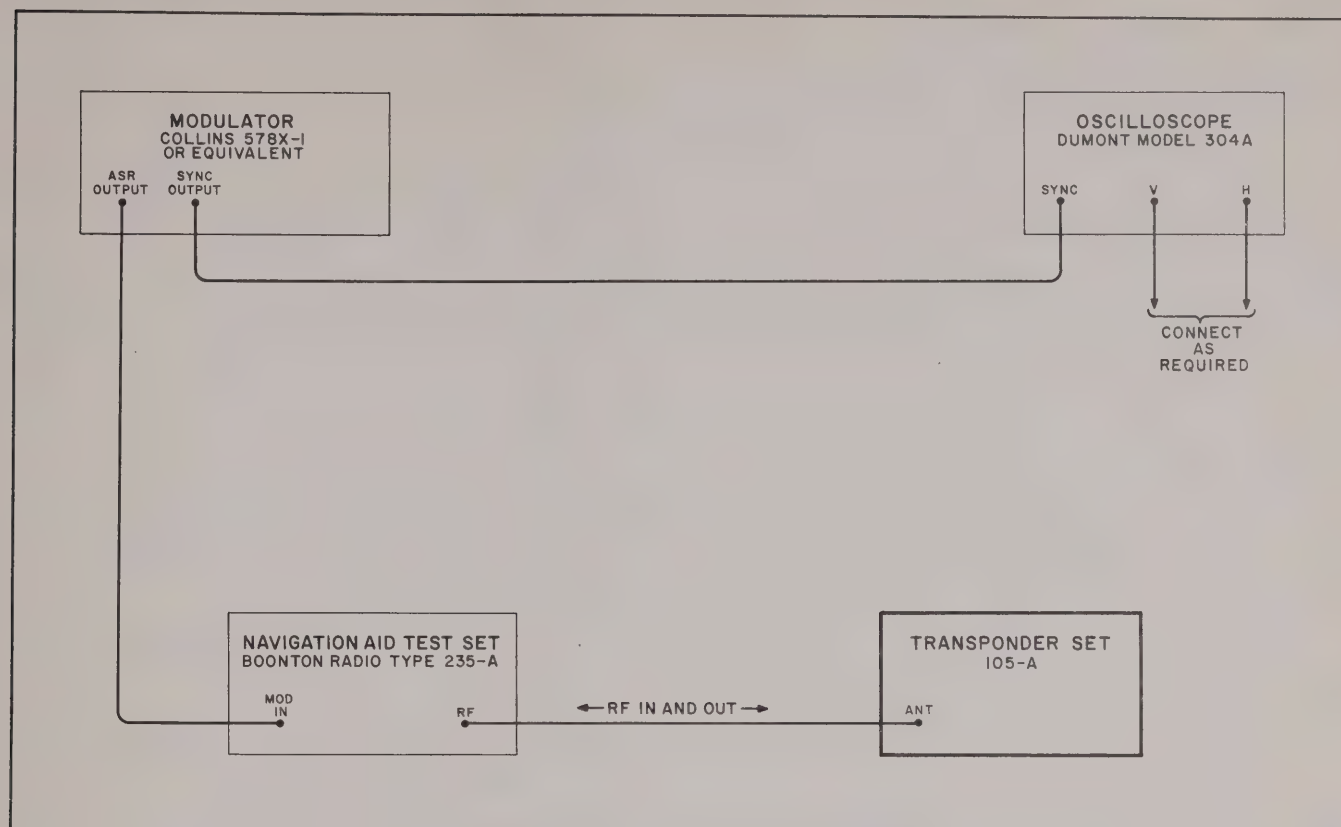


Figure 5-4. Bench Test Setup for Transponder Measurements

TP4303

5-5. MEASUREMENT AND ADJUSTMENT OF LOCAL OSCILLATOR CAVITY Z2.

To check and adjust the output of local oscillator cavity Z2, proceed as follows:

Step 1. Connect transponder set as shown in Figure 5-3, and connect transponder and test equipment as shown in Figure 5-4.

Step 2. Connect Dumont Model 304A Oscilloscope to TEST POINT on assembly A1 of the coder (see Figure 6-6).

Step 3. Turn on transponder and test equipment and allow equipment to warm up.

Step 4. Adjust Boonton Radio Navigation Aid Test Set Type 235A for a 1030-mc pulsed input signal to the transponder.

Step 5. Vary **FREQ TRIM** screw on local oscillator cavity Z2 to provide the best amplitude and squarest pulse shape on the oscilloscope.

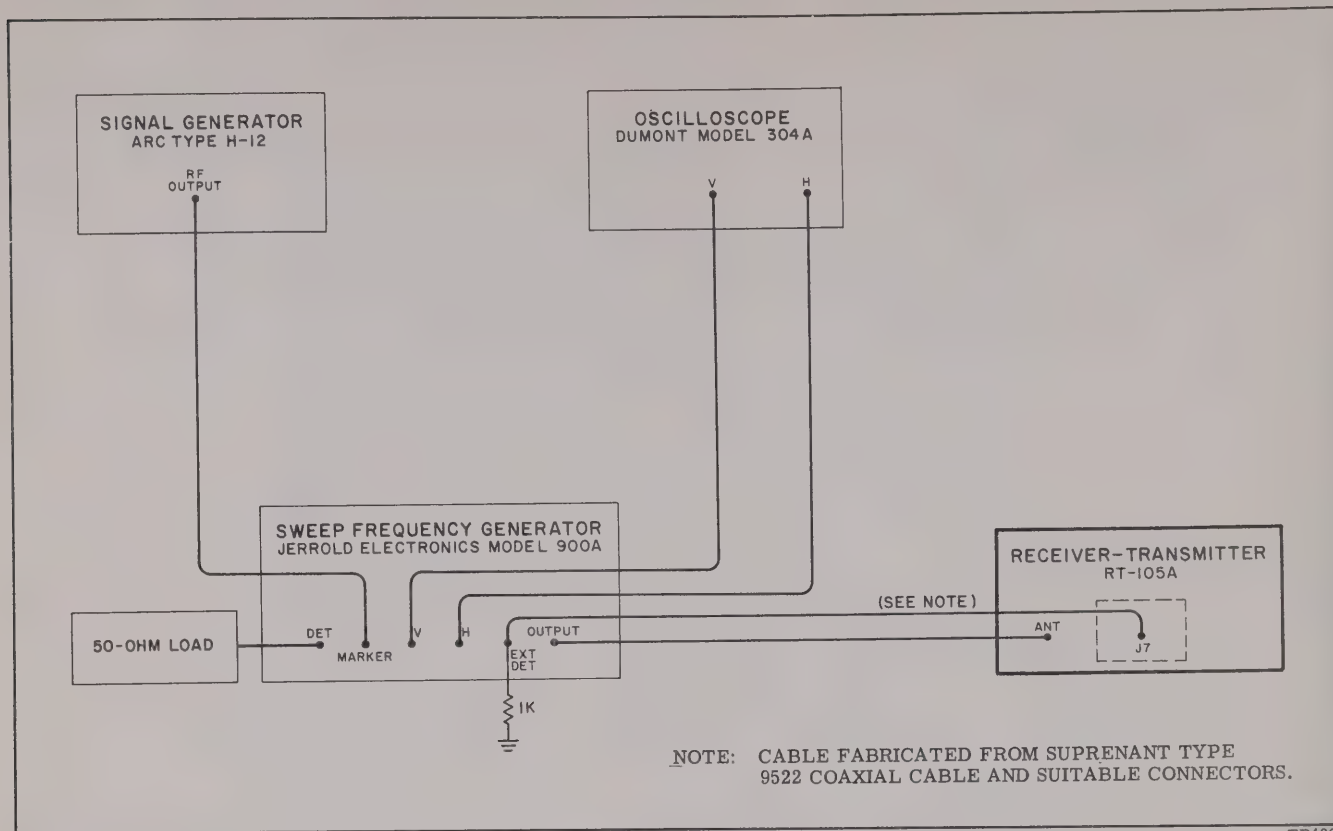
5-6. FREQUENCY ADJUSTMENT OF PRESELECTOR CAVITY Z3.

To adjust the frequency of preselector cavity Z3, proceed as follows:

Step 1. Disconnect connector P7 from connector J7 on mixer Z4 of receiver-transmitter, and connect receiver-transmitter and test equipment as shown in Figure 5-5.

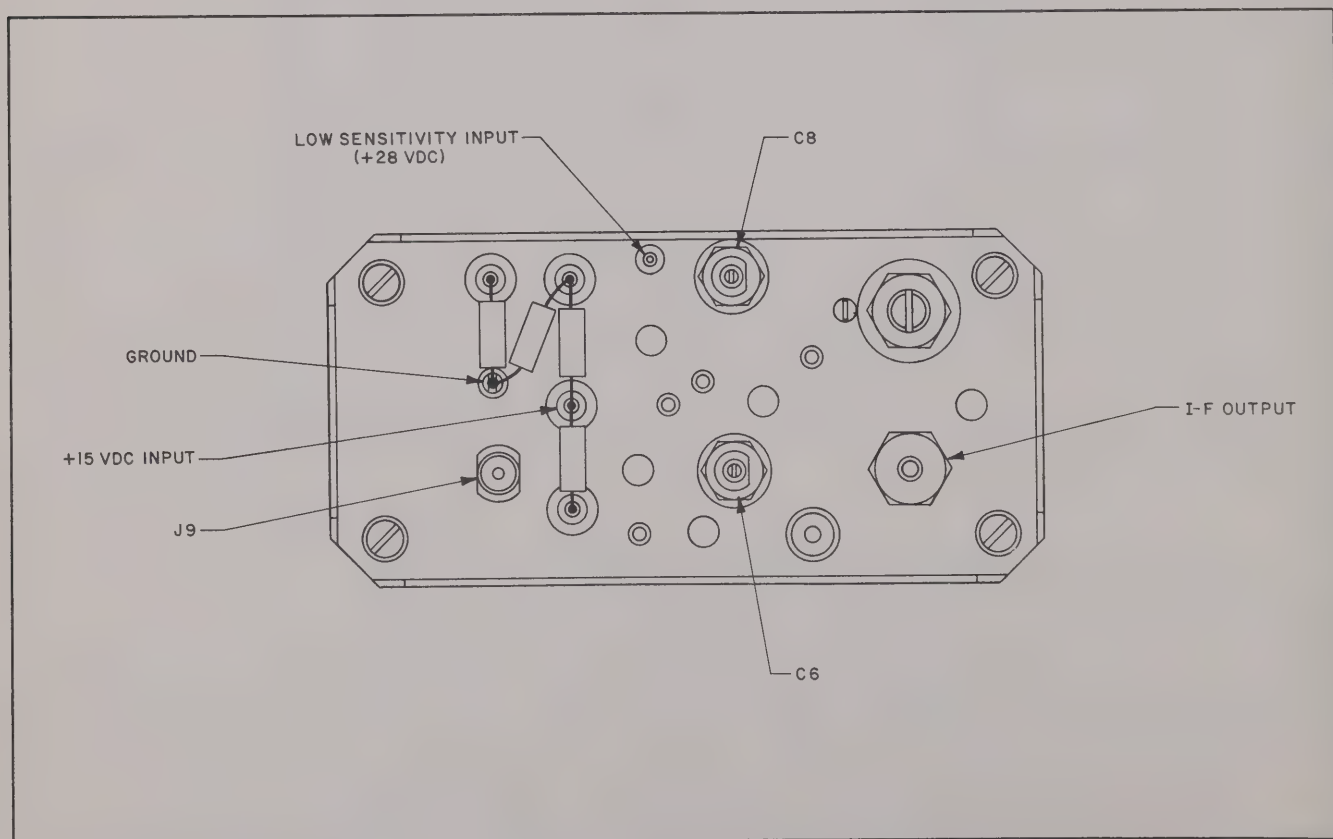
Step 2. Turn on test equipment and allow to warm up.

Step 3. Adjust ARC Type H-12 Signal Generator and Jerrold Electronics Model 900A Sweep Frequency Generator to obtain a swept pattern centered at 1030 mc.



TP4305

Figure 5-5. Bench Test Setup for Adjustment of Preselector Z3



TP4307

Figure 5-6. 60-mc Preamplifier, Adjustment Points

Step 4. Check passband of preselector output on Dumont Model 304A Oscilloscope. It should be centered at 1030 mc.

Step 5. If necessary, adjust three preselector tuning screws to achieve a passband centered at 1030 mc.

5-7. ALIGNMENT PROCEDURES AND GAIN MEASUREMENTS FOR 60-MC PREAMPLIFIER.

General. The following paragraphs describe alignment procedures and gain measurements for the 60-mc preamplifier. Parts locations are shown in Figure 6-3 and test points are located in Figure 5-6. Check the d-c voltages in Table 5-6 to verify the operation of transistors Q1 and Q5 and diode CR24 before performing the alignment procedures.

60-mc Preamplifier Alignment. Align the 60-mc preamplifier stage as follows:

Step 1. Connect bench test setup as shown in Figure 5-7. Connect +15 volts dc to +15-volt input terminal of preamplifier (Figure 5-6) and connect ground terminal to power ground.

Step 2. Turn on test equipment and +15-volt power supply, and allow equipment to warm up.

Step 3. Set Hewlett-Packard Model 608D Signal Generator for a CW output at 60 mc, and set Hewlett-Packard Model 355C Attenuator to 9 db.

Step 4. Alternately adjust variable capacitors C6 and C8 for a passband similar to waveform shown in Figure 5-9. When stage is properly adjusted, center frequency (fc) should be 60 megacycles, and amplitudes of two peaks should be equal.

Note

When either L3 or L4 has been replaced or the relative position of the coils has been disturbed, the position of L4 must be adjusted before the stage can be properly aligned. L4 adjusts the peak-to-valley (P-V) ratio of the waveform. With L4 centered in L3, the peak-to-valley will be at maximum.

Step 5. Check values of fc, fl, fh, and P-V for bandwidth, as shown in Figure 5-9.

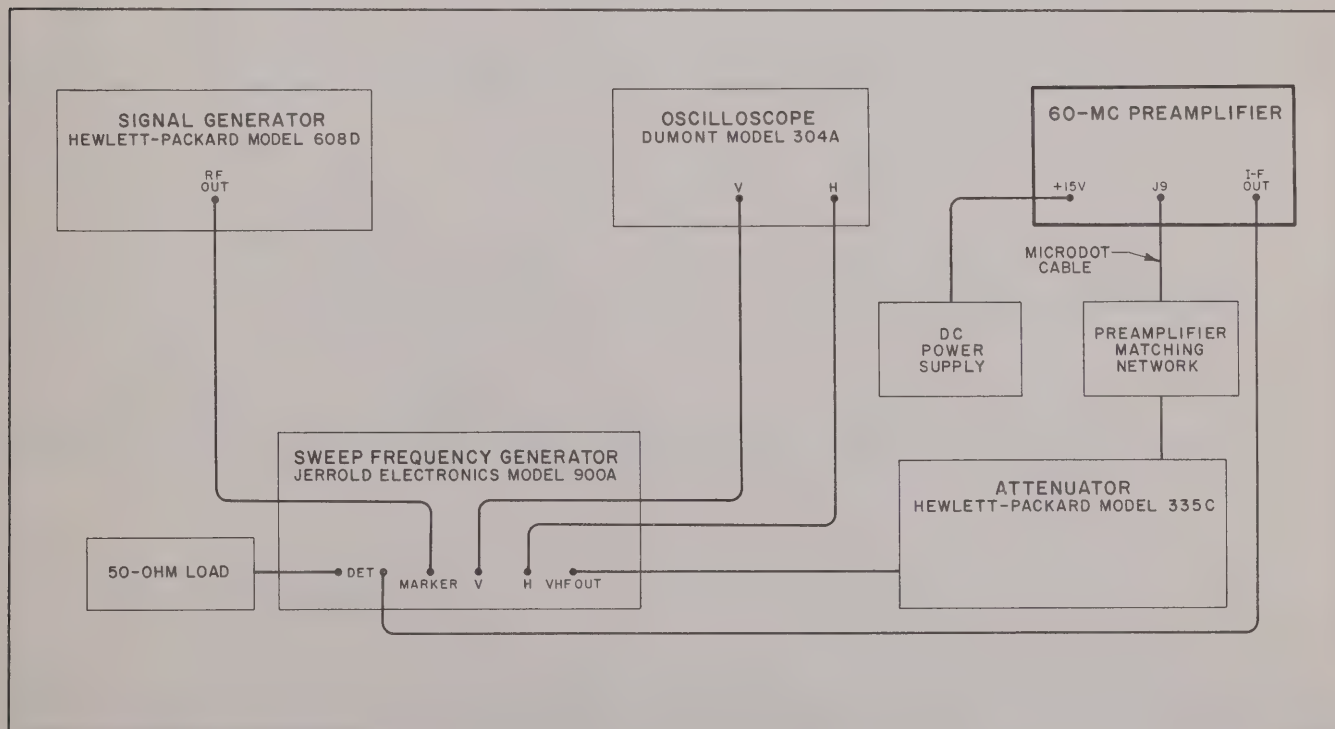


Figure 5-7. Bench Test Setup for Alignment of 60-mc Preamplifier

TP4309

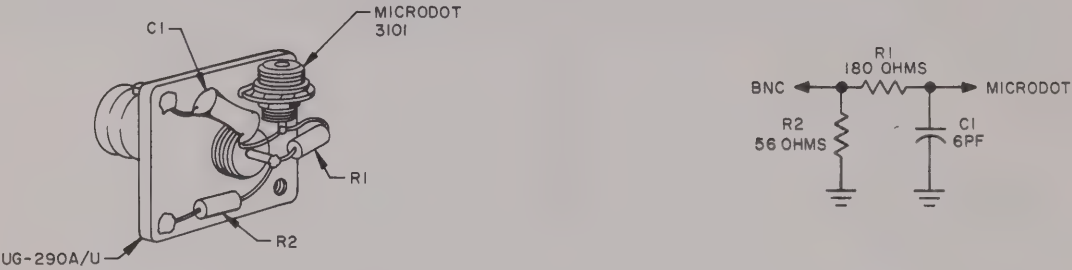
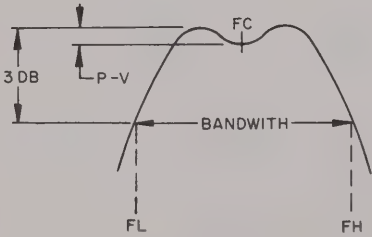


Figure 5-8. Preamplifier Matching Network for Bench Test Setup

TP4311



LIMITING VALUES				
BANDWIDTH	MC FC	MC FL	MC FH	DB P-V
AVERAGE	60	47	73	0.3
MINIMUM	60	51	69	0.1
MAXIMUM	60	43	77	0.5

Figure 5-9. Waveform for 60-mc Preamplifier Alignment

TP4313

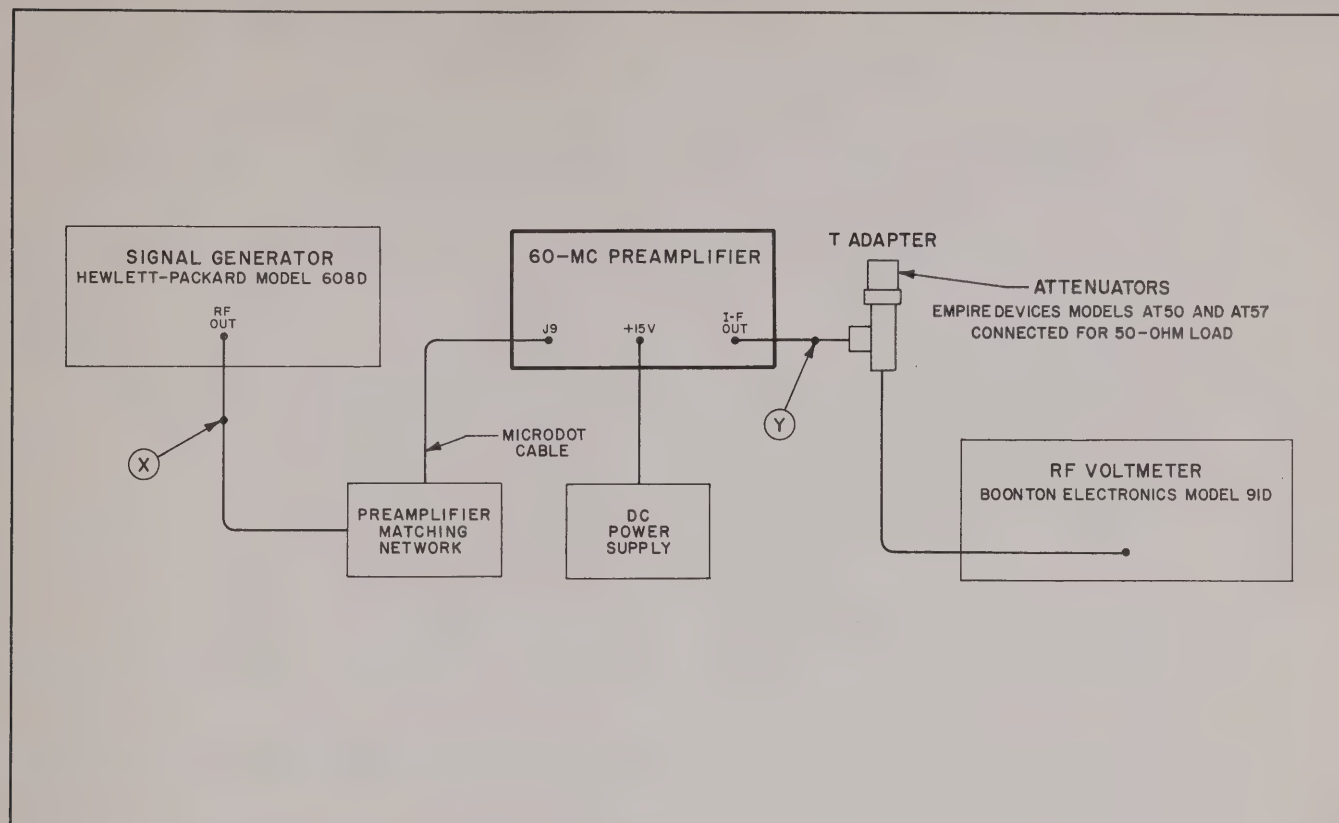


Figure 5-10. Bench Test Setup for 60-mc Preamplifier Gain Measurement

TP4319

Gain Measurement. Measure the gain of the 60-mc preamplifier as follows:

Step 1. Connect bench test setup as shown in Figure 5-10. Turn on equipment and allow it to warm up.

Step 2. Adjust attenuator dial of Hewlett-Packard Model 608D Signal Generator to between 35 and 45 db, so that reading on Boonton Electronics Model 91D r-f voltmeter provides a convenient reference point.

Step 3. Record db reading of attenuator dial.

Step 4. Short point "X" (Figure 5-10) directly to point "Y."

Step 5. Adjust signal generator attenuator dial for same r-f voltmeter reading as selected in Step 2.

Step 6. Record db reading of attenuator dial.

Step 7. Subtract db reading in Step 6 from db reading in Step 3. Add 8 db to result (to compensate for loss in matching network). Result is db gain of preamplifier, which should be between 18 and 24 db.

5-8. FREQUENCY ALIGNMENT PROCEDURES AND VIDEO AMPLIFIER GAIN MEASUREMENTS FOR CODER ASSEMBLY A1.

General. The following paragraphs describe procedures for frequency alignment of the i-f amplifier stages and for video amplifier gain measurements. For these procedures, assembly A1 is physically removed from the coder chassis (paragraph 5-3), but is electrically connected in the transponder circuit to use the voltages from the two power supplies. Using a cable harness as shown in Figure 5-3, interconnect the units of the transponder set and the +28-volt dc and 115-volt, 400-cps ac inputs.

Frequency Alignment. Align the frequency of the i-f amplifiers in assembly A1 as follows:

Note

Perform each step of the procedure in the order given. When aligning a stage for which the desired response is difficult to achieve, never vary a previously tuned capacitor to compensate the pattern.

Step 1. Connect bench test setup as shown in Figure 5-11.

Step 2. Set test equipment as follows:

- a. Hewlett-Packard Model 608D Signal Generator for output of 60 mc, cw.
- b. Jerrold Electronics Model 900A Sweep Frequency Generator to sweep in 60-mc region.
- c. Hewlett-Packard Model 335D and Model 335C Attenuators so that sum of two settings is 20 db.

Step 3. Unsolder jumper (connected between pin 4 of A1V1 and A1R29) from pin 4 of A1V1. "Tack-solder" center lead of i-f input cable to pin 4 and connect ground lead to chassis.

Step 4. Turn on test equipment and transponder, and allow the equipment to warm up.

Step 5. Adjust tuning capacitors A1C36 and A1C39 (and, if necessary, position of A1L17) for a passband similar to waveform shown in Figure 5-12.

Step 6. Vary gain of Ballantine Model 300D voltmeter and vary settings of input attenuators to set amplitude of frequency response on Dumont Model 304A Oscilloscope to a 1-volt reference voltage. (Sum of attenuator settings should be between 15 and 25 db.)

Step 7. Repeat Step 5

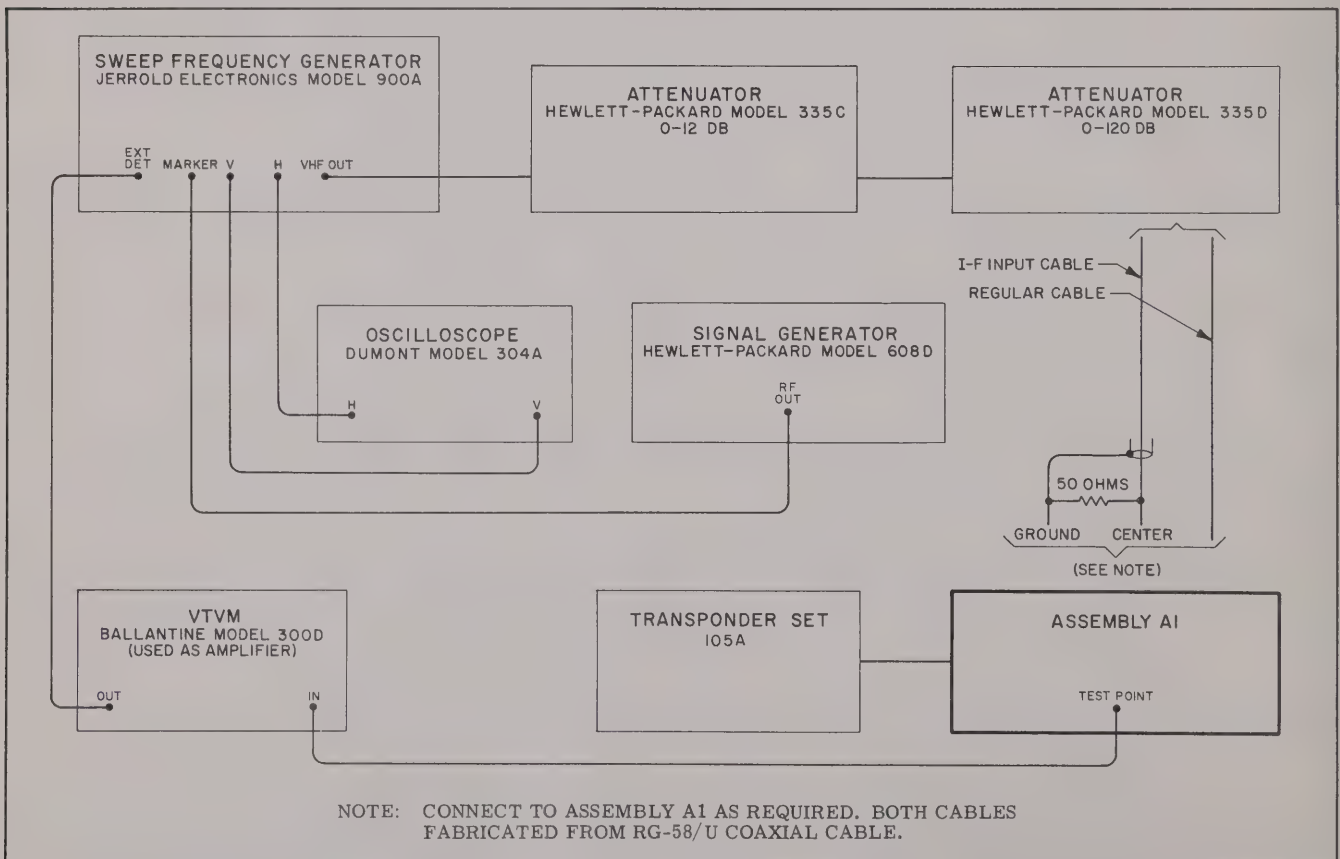


Figure 5-11. Bench Test Setup for I-f Amplifier Alignment and Compressor Stage Adjustment

TP4321

Step 8. Turn off transponder.

Step 9. Disconnect center lead from pin 4 of A1V1 and reconnect jumper between pin 4 and A1R29.

Step 10. Disconnect one end of A1L13 from its mounting clip.

Step 11. Unsolder grounded terminal of A1R28, and "tack-solder" center lead of i-f input cable to normally grounded terminal of A1R28.

Step 12. Turn on transponder.

Step 13. Vary attenuator settings as necessary to set amplitude of frequency response to 1-volt reference voltage.

Step 14. Adjust tuning capacitors A1C32 and A1C33 (and, if necessary, position of A1L15) for a passband similar to waveform shown in Figure 5-12.

Step 15. Turn off transponder.

Step 16. Disconnect center lead from A1R28 and reconnect grounded terminal of A1R28.

Step 17. Reconnect lead of A1L13.

Step 18. Unsolder terminal of A1R23 from junction with A1R20 and A1C23, and "tack-solder" center lead of i-f input cable to free end of A1R23.

Step 19. Turn on transponder.

Step 20. Vary attenuator settings as necessary to set amplitude of frequency response to 1-volt reference voltage.

Step 21. Adjust position of A1L13 and setting of tuning capacitors A1C26 and A1C27 for a passband similar to waveform shown in Figure 5-12.

Step 22. Turn off transponder.

Step 23. Disconnect center lead from A1R23 and restore A1R23 to junction of A1R20 and A1C23.

Step 24. Disconnect A1R15 from junction with A1C14 and A1R12, and "tack-solder" center lead of i-f input cable to free end of A1R15.

Step 25. Turn on transponder.

Step 26. Vary attenuator settings as necessary to set amplitude of frequency response to 0.25-volt reference voltage on oscilloscope.

Step 27. Vary resistor A3R64 (part of regulated power supply; see Figure 6-10) as necessary to maximize the amplitude of frequency response. Repeat Step 26.

Step 28. Adjust A1C25 to maximize amplitude of frequency response at 60 mc. Repeat Step 26.

Step 29. Decrease sum of attenuator settings by 20 db. Vary gain of oscilloscope so that entire frequency response can be observed.

Step 30. Adjust tuning capacitors A1C17 and A1C18 (and, if necessary, position of A1L9) for a passband similar to waveform shown in Figure 5-12.

Step 31. Refer to Figure 5-13. Increase attenuator settings in 1-db steps to level at which amplitude of frequency response is 0.25 volt. At all input levels, frequency response should exhibit:

- a. "Tilt" (difference in amplitude of the two peaks) - less than 0.5 db.
- b. Center frequency (fc) shift - less than ± 0.5 mc.
- c. Consistent symmetry.

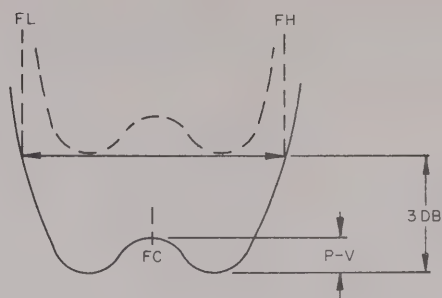
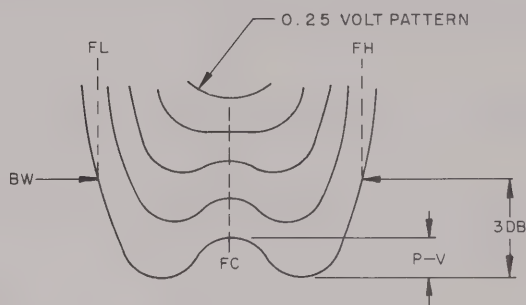


Figure 5-12. Waveform for I-f Amplifier Alignment

TP4315



NOTE: ALTHOUGH 0.25 VOLT PATTERN IS USUALLY SINGLE-PEAKED, A DOUBLE-PEAKED PATTERN IS ACCEPTABLE.

Figure 5-13. Waveform for Compressor Stage Adjustment

TP4317

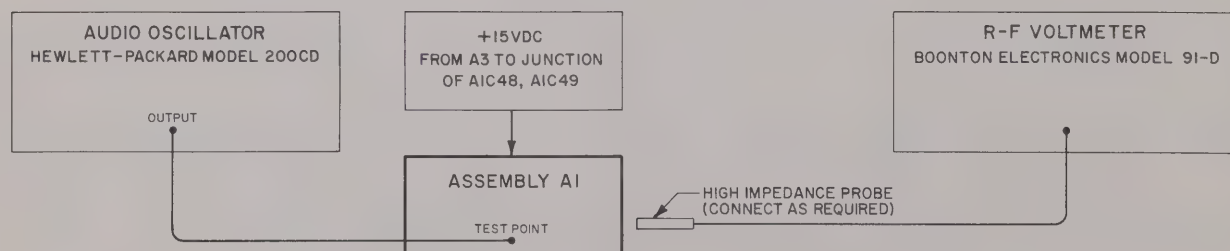


Figure 5-14. Bench Test Setup for Video Amplifier Gain Measurements

TP4323

Step 32. If necessary, repeat Steps 26–31 until qualifications in Step 31 are met.

Step 33. Turn off transponder.

Step 34. Disconnect center lead from A1R15 and reconnect A1R15 to junction of A1C14 and A1R12. Disconnect ground lead from chassis.

Step 35. Disconnect i-f input test cable from Model 355D attenuator, and connect a standard cable between Model 355D and i-f input of A1 (junction of A1R1 and A1C1).

Step 36. Turn on transponder.

Step 37. Vary attenuator settings as necessary to set amplitude of frequency response to 0.25 volt on oscilloscope.

Step 38. Vary resistor A3R63 (part of regulated power supply; see Figure 6-10) as necessary to maximize amplitude of frequency response. Repeat Step 37.

Step 39. Adjust A1C16 to maximize amplitude of response at 60 mc, and repeat Step 37.

Step 40. Decrease sum of attenuator settings by 20 db. Vary gain of oscilloscope so that entire frequency response can be observed.

Step 41. Adjust tuning capacitors A1C8 and A1C9 (and, if necessary, position of A1L5) for a passband similar to waveform shown in Figure 5-12.

Step 42. Repeat Step 31.

Step 43. If necessary, repeat Steps 37–42 until qualifications in Step 31 are met.

Step 44. Turn off transponder and test equipment.

Video Gain Measurement. Measure the gain of the video amplifier stage as follows:

Step 1. Connect test setup as shown in Figure 5-14.

Step 2. Remove crystal diode A1CR3 (paragraph 5-4).

Step 3. Connect 1000-ohm resistor between collector of transistor A1Q6 and chassis ground.

Step 4. Turn on test equipment and allow equipment to warm up. Apply +15 volts dc to junction of A1C48 and A1R49.

Step 5. Set Hewlett-Packard Model 200CD Oscillator for 0.5-mc output.

Step 6. Connect high-impedance probe of Boonton Electronics Model 91D r-f voltmeter directly to output of 200CD, and adjust amplitude of 200CD for 50-mv indication on r-f voltmeter.

Step 7. Reconnect high-impedance probe to collector of A1Q6.

Step 8. Record indication on r-f voltmeter.

Step 9. Calculate video amplifier gain: $\text{Gain} = \frac{\text{Output mv}}{\text{Input mv}}$. Gain should be greater than 10.

5-9. TYPICAL CODER WAVEFORMS.

Typical coder waveforms, point of measurement, and waveform identification are listed in Table 5-4. Connect the transponder set and the test equipment as shown in Figures 5-3 and 5-4. (Substitute the Tektronix Model 545 Oscilloscope for the Dumont Model 304A Oscilloscope.) Set the Boonton Radio Navigation Aid Test Set Type 235A and the Collins Radio Modulator Model 578X-1 to interrogate the transponder with a 1030-mc pulse signal. Connect the Tektronix Model 545 Oscilloscope, as indicated, to measure the typical waveforms. When the Type 235A test set is not available, waveforms in Steps 6–12 may be reproduced using the pulse signal from the transponder self-test feature and the 545 oscilloscope.

TABLE 5-4. TYPICAL CODER WAVEFORMS






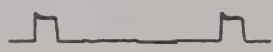









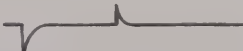

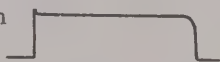



Step	Point of Measurement	Waveform Identification
1	A2R1	3-pulse Video Input: Sidelobe Signal  Proper Interrogation 
2	A2CR1 Cathode	Pulse Amplitude Comparison, "Ditch-digger" Circuit: Sidelobe Signal  Proper Interrogation 
3	A2Q3, Collector Output	Output of Pulse Amplitude Comparator Stage: Sidelobe Signal  Proper Interrogation 
4	Delay Line A2Z1	Sidelobe Signal, Pulses P1 and P2: .6 μ sec tap  .9 μ sec tap  2.6 μ sec tap  Pulse output of A2Q8  Proper Interrogation Signal, Pulses P1 and P3: .6 μ sec tap  .9 μ sec tap  Pulse output of A2Q7 
5	A2Q10, Collector Output	SLS Suppression Pulse (35 μ sec) 
6	A. A2Q9, Emitter Output B. A2CR16 or A2CR17 Output C. A2Q20, Collector Output	Mode 3/A Pulse Pair  Output of 8- μ sec Multivibrator  Output of 8- μ sec Coincidence Gates 
7	A. A3Q2, Collector Output B. A3Q9, Collector Output	35- μ sec Pulse Output of Suppression and Reply Gate Generator  Output of Keyed Oscillator 
8	A3Q12, Collector Output	Output of Zero-cross Detector Amplifier 
9	A. A3Q13, Emitter Output B. A3Q13, Collector Output	Outputs of Phase Inverter 

TABLE 5-4. TYPICAL CODER WAVEFORMS - Continued

Step	Point of Measurement	Waveform Identification
10	A. A3Q15, Base Input	Timing Pulses to Coincidence Gate: -C -D Gates
	B. A3Q18, Base Input	-A -B Gates
11	A. A3Q19, Base Input	Output from A-B Bus, Mode 3/A Code 00
	B. A3Q16, Base Input	Output from C-D Bus, Mode 3/A Code 00
	C. A3Q19, Base Input	Output from A-B Bus, Mode 3/A Code 2162 with IDENT Pulse
	D. A3Q16, Base Input	Output from C-D Bus, Mode 3/A Code 2162 with IDENT Pulse
12	A3Q21, Base Input	Reply-pulse Triggers, Mode 3/A Code 00
		Reply-pulse Triggers, Mode 3/A Code 2162 with IDENT Pulse

5-10. VOLTAGE MEASUREMENTS.

Typical voltage measurements for the receiver-transmitter and the coder are listed in Tables 5-5 through 5-10. The measurements were made under the conditions noted in each table.

TABLE 5-5. RECEIVER-TRANSMITTER VOLTAGE MEASUREMENTS

Conditions:

1. Transponder units connected as shown in Figure 5-3, both input voltages applied, no signal input.
2. D-c measurements made with Hewlett-Packard Model 412A vtvm or equivalent. Voltages are positive dc unless otherwise specified, and are measured with respect to chassis ground.
3. A-c measurements made with Ballantine Model 300D vtvm or equivalent.
4. Anode voltage of V2 (+1800 vdc) measured at voltage-doubler circuit (junction of CR20, CR21, Figure 6-1) as +900 vdc because of vtvm limitation.
5. Voltage measurements for receiver 60-mc preamplifier contained in Table 5-6.

Tube or Transistor	Terminal	Vtvm Scale	Voltage	Tube or Transistor	Terminal	Vtvm Scale	Voltage
V1 (8058)	Anode Heater	100	68 vdc	Q3 (2N2087)	E	3	0
		10	6.3 vac		B	3	0
V2 (ML-7815/R)	Anode Heater Grid	1000	Condition 4		C	100	39 vdc
		10	6.0 vac	Q4 (2N1499A)	E	30	10 vdc
		-100	-72 vdc		B	30	10 vdc
Q2 (2N2087)	E	-100	-72 vdc		C	3	0
	B	-100	-75 vdc				
	C	3	0				

TABLE 5-6. 60-MC PREAMPLIFIER VOLTAGE MEASUREMENTS

Conditions:

1. Preamplifier removed from r-t unit.
2. Power input connections to the preamplifier as follows:
 - a. Ground terminal connected to power ground for all measurements.
 - b. For normal sensitivity measurements, +15 volts dc connected to +15-volt input terminal.
 - c. For low-sensitivity measurements, +15 volts dc connected to +15-volt input terminal, and +28 volts dc connected to low sensitivity input terminal.
3. Measurements made with Hewlett-Packard Model 412A vtm, or equivalent. Voltages are positive dc and are measured with respect to chassis ground.

Transistor or Diode	Terminal	Vtm Scale	Voltage	
			Normal Sensitivity	Low Sensitivity
Q1 (2N2996)	E	10	5	5
	B	10	4.8	4.8
	C	3	0	0
Q5 (2N1304)	E	3	0	0
	B	3	0	2.5
	C	30	15	0
CR24 (1N662A)	Anode	10	5	.6
	Cathode	30	15	0

TABLE 5-7. CODER ASSEMBLY A1, VOLTAGE MEASUREMENTS

Conditions:

1. Transponder units connected as shown in Figure 5-3, both input voltages applied, no signal input.
2. D-c measurements made with Hewlett-Packard Model 412A vtm or equivalent. Voltages are positive dc unless otherwise specified, and are measured with respect to chassis ground.
3. A-c measurements are made with Ballantine Model 300D vtm or equivalent.
4. Measurements are made at indicated points (keyed to Figure 6-6) so that unit disassembly is not required.

Tube, Transistor, or Diode	Point of Measurement	Vtm Scale	Voltage
A1V1 (7587)	A1C38	100	68
	A1C37	100	63
	A1C34	10	6.3 vac
A1Q1 (2N2398)	A1C5	30	10
	A1C6	30	10.4
	A1C7	30	13.5
A1Q2 (2N2398)	A1C11	30	10
	A1C12	30	10.4
	A1C13	30	13.7
A1Q3 (2N2398)	A1C20	30	10.4
	A1C21	30	10.7
	A1C22	30	14.2

TABLE 5-7. CODER ASSEMBLY A1, VOLTAGE MEASUREMENTS - Continued

Tube, Transistor, or Diode	Point of Measurement	Vtvm Scale	Voltage
A1Q4 (2N2398)	A1C29	30	10.7
	A1C30	30	11
	A1C31	30	14.8
A1Q5, A1Q6 (2N1499A [2])	A1C42, A1R40 Junction	10	8.7
	A1C46, A1R47 Junction	10	8.5
	A1C47	30	15.2
	A1C48	30	15.8
A1CR1 (1N3713)	C15	1	0.115
A1CR2 (1N3713)	C24	1	0.115

TABLE 5-8. CODER ASSEMBLY A2, VOLTAGE MEASUREMENTS

Conditions:

- +27.5 volts dc applied to coder; no pulse signal applied.
- Measurements made with Hewlett-Packard Model 412A vtvm, or equivalent. Voltages are positive dc and are measured with respect to chassis ground.

Transistor	Element	Scale	Voltage
A2Q1 (2N1499A)	E	30	19.9
	B	30	19.9
	C	10	4.1
A2Q2 (2N706M)	E	10	4.6
	B	10	5.2
	C	30	12.9
A2Q3 (2N1499A)	E	30	12
	B	30	13
	C	10	0
A2Q4 (2N1499A)	E	30	12
	B	30	12
	C	30	12
A2Q5 (2N711)	E	10	5.7
	B	10	5.3
	C	10	0
A2Q6 (2N711)	E	10	5.7
	B	10	5.3
	C	10	0
A2Q7 (2N1499A)	E	10	5.7
	B	10	6.4
	C	3	.36
A2Q8 (2N1499A)	E	10	5.7
	B	10	6.9
	C	10	0

Transistor	Element	Scale	Voltage
A2Q9 (2N1304)	E	3	.28
	B	3	.36
	C	10	10.1
A2Q10 (2N706A)	E	10	5.3
	B	10	6
	C	10	5.4
A2Q11 (2N585)	E	30	15.2
	B	30	15.2
	C	30	15.2
A2Q12 (2N585)	E	10	5.3
	B	10	5
	C	30	15.2
A2Q13 (2N1305)	E	30	20
	B	30	20
	C	10	0
A2Q14 (2N706A)	E	10	5.3
	B	10	4.9
	C	30	20.5
A2Q15 (2N1304)	E	30	20.5
	B	30	20.5
	C	30	20.5
A2Q16 (2N706A)	E	10	5.3
	B	10	6
	C	10	5.5

TABLE 5-8. CODER ASSEMBLY A2, VOLTAGE MEASUREMENTS - Continued

Transistor	Element	Scale	Voltage
A2Q17 (2N706A)	E	10	5.2
	B	10	5.4
	C	30	20.5
A2Q18 (2N1499A)	E	10	5.5
	B	10	5.3
	C	10	0
A2Q19 (2N711)	E	10	5.5
	B	10	5.3
	C	10	0
A2Q20 (2N1499A)	E	10	5.5
	B	10	5.9
	C	10	0
A2Q21 (2N1304)	E	10	0
	B	10	0
	C	30	10.1
A2Q22 (2N706A)	E	10	5.3
	B	10	4.9
	C	30	20.5
A2Q23 (2N1304)	E	30	20.5
	B	30	20.5
	C	30	20.5
A2Q24 (2N706A)	E	10	5.3
	B	10	6
	C	10	5.5
A2Q25 (2N706A)	E	10	5.3
	B	10	5.4
	C	30	20.5
A2Q26 (2N706A)	E	10	5.3
	B	10	4.9
	C	30	20.5
A2Q27 (2N1304)	E	30	20.5
	B	30	20.5
	C	30	20.5
A2Q28 (2N706A)	E	10	5.3
	B	10	6.1
	C	10	5.5

Transistor	Element	Scale	Voltage
A2Q29 (2N706A)	E	10	5.2
	B	10	5.4
	C	30	20.5
A2Q30 (2N1499A)	E	10	5.5
	B	10	5.3
	C	10	0
A2Q31 (2N711)	E	10	5.5
	B	10	5.3
	C	10	0
A2Q32 (2N1499A)	E	10	5.5
	B	10	5.9
	C	10	0
A2Q33 (2N1304)	E	10	0
	B	10	0
	C	30	10.1
A2Q34 (2N706A)	E	10	5.3
	B	10	4.9
	C	30	20.5
A2Q35 (2N1304)	E	30	20.5
	B	30	20.5
	C	30	20.5
A2Q36 (2N706A)	E	10	5.3
	B	10	6
	C	10	5.5
A2Q37 (2N706A)	E	10	5.3
	B	10	5.4
	C	30	20.5
A2Q38 (2N585)	E	10	5.3
	B	10	4.8
	C	10	5.4
A2Q39 (2N585)	E	10	5.3
	B	10	4.8
	C	10	5.4

TABLE 5-9. CODER ASSEMBLY A3, VOLTAGE MEASUREMENTS

Conditions:

1. +27.5 volts dc applied to coder; no pulse signal applied.
2. Measurements are made with Hewlett-Packard Model 412A vtvm, or equivalent. Voltages are positive dc and are measured with respect to chassis ground.

Transistor	Element	Scale	Voltage
A3Q1 (2N585)	E	10	5.3
	B	10	4.7
	C	10	15.5
A3Q2 (2N706A)	E	3	0
	B	3	.25
	C	3	.29
A3Q3 (2N706A)	E	3	.83
	B	3	.29
	C	30	20.5
A3Q4 (2N1305)	E	30	15.5
	B	30	15.5
	C	3	0
A3Q5 (2N1305)	E	30	15.5
	B	30	20.5
	C	3	0
A3Q6 (2N1305)	E	30	15.5
	B	30	20.5
	C	3	0
A3Q7 (2N1305)	E	30	15.5
	B	30	20.5
	C	3	0
A3Q8 (2N1304)	E	3	1.15
	B	3	1.2
	C	30	20.5
A3Q9 (2N706A)	E	10	4.4
	B	10	5.1
	C	30	11.5
A3Q10 (2N1499A)	E	10	5.5
	B	10	5.3
	C	10	0
A3Q11 (2N1499A)	E	10	5.5
	B	10	5.3
	C	10	2.55
A3Q12 (2N1499A)	E	30	14.1
	B	30	13.8
	C	10	5.3
A3Q13 (2N706A)	E	10	2.7
	B	10	3.4
	C	30	13.5
A3Q14 (2N706A)	E	10	5.3
	B	10	6
	C	10	5.5

Transistor	Element	Scale	Voltage
A3Q15 (2N1499A)	E	10	5.3
	B	10	5.3
	C	10	0
A3Q16 (2N711)	E	10	5.3
	B	10	5.1
	C	10	0
A3Q17 (2N1499A)	E	10	5.3
	B	10	5.8
	C	10	0
A3Q18 (2N1499A)	E	10	5.5
	B	10	5.3
	C	10	0
A3Q19 (2N711)	E	10	5.5
	B	10	5.3
	C	10	0
A3Q20 (2N1499A)	E	10	5.5
	B	10	5.8
	C	10	0
A3Q21 (2N706A)	E	10	0
	B	10	0
	C	30	10.1
A3Q22 (2N657A)	E	30	20.5
	B	30	21
	C	30	27.5
A3Q23 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q24 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q25 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q26 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q27 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q28 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0

TABLE 5-9. CODER ASSEMBLY A3, VOLTAGE MEASUREMENTS - Continued

Transistor	Element	Scale	Voltage
A3Q29 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q30 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q31 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q32 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q33 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q34 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0

Transistor	Element	Scale	Voltage
A3Q35 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q36 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q37 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q38 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0
A3Q39 (2N585)	E	10	5.4
	B	10	0
	C	30	16.7
A3Q40 (2N1499A)	E	30	15.1
	B	30	16.7
	C	10	0

TABLE 5-10. CODER ASSEMBLY A4, VOLTAGE MEASUREMENTS

Conditions:

1. Transponder units connected as shown in Figure 5-3, and both input voltages applied.
2. Switch S1 held "on" in either position so that +20 volts dc is applied to pin 14 or pin 29 of coder connector.
3. Measurements made with Hewlett-Packard Model 412A vtvm, or equivalent. Voltages are positive dc unless otherwise specified and are measured with respect to chassis ground.

Transistor	Element	Scale	Voltage
A4Q1 (2N1304)	E	3	0
	B	-10	-4.4
	C	30	10
A4Q2 (2N1304)	E	3	0
	B	-10	-4.0
	C	10	9.3
A4Q3 (2N706A)	E	10	5
	B	10	4.7
	C	30	20
A4Q4 (2N1304)	E	30	19.7
	B	30	19.7
	C	30	20
A4Q5 (2N706A)	E	10	5
	B	10	5.8
	C	10	5.5

Transistor	Element	Scale	Voltage
A4Q6 (2N706A)	E	10	5
	B	10	4.6
	C	30	19.8
A4Q7 (2N1304)	E	30	19.8
	B	30	19.8
	C	30	19.8
A4Q8 (2N706M)	E	10	5
	B	10	5.8
	C	10	5.4
A4Q9 (2N2087)	E	3	0
	B	3	0
	C	100	66

SECTION VI

DIAGRAMS

Figure 6-1. RT-105A Receiver-Transmitter, Schematic Diagram

Figure 6-2. RT-105A Receiver-Transmitter, Main Chassis, Wiring Diagram

Figure 6-3. RT-105A Receiver-Transmitter, 60-mc Preamplifier Assembly, Wiring Diagram

Figure 6-4. RT-105A Receiver-Transmitter, Printed-circuit Assembly, Wiring Diagram

Figure 6-5. CO-105A Coder, I-f Amplifier-Detector Assembly A1, Schematic Diagram

Figure 6-6. CO-105A Coder, I-f Amplifier-Detector Assembly A1, Wiring Diagram

Figure 6-7. CO-105A Coder, Decoder Assembly A2, Schematic Diagram

Figure 6-8. CO-105A Coder, Decoder Assembly A2, Wiring Diagram

Figure 6-9. CO-105A Coder, Encoder-Power Supply Assembly A3, Schematic Diagram

Figure 6-10. CO-105A Coder, Encoder-Power Supply Assembly A3, Wiring Diagram

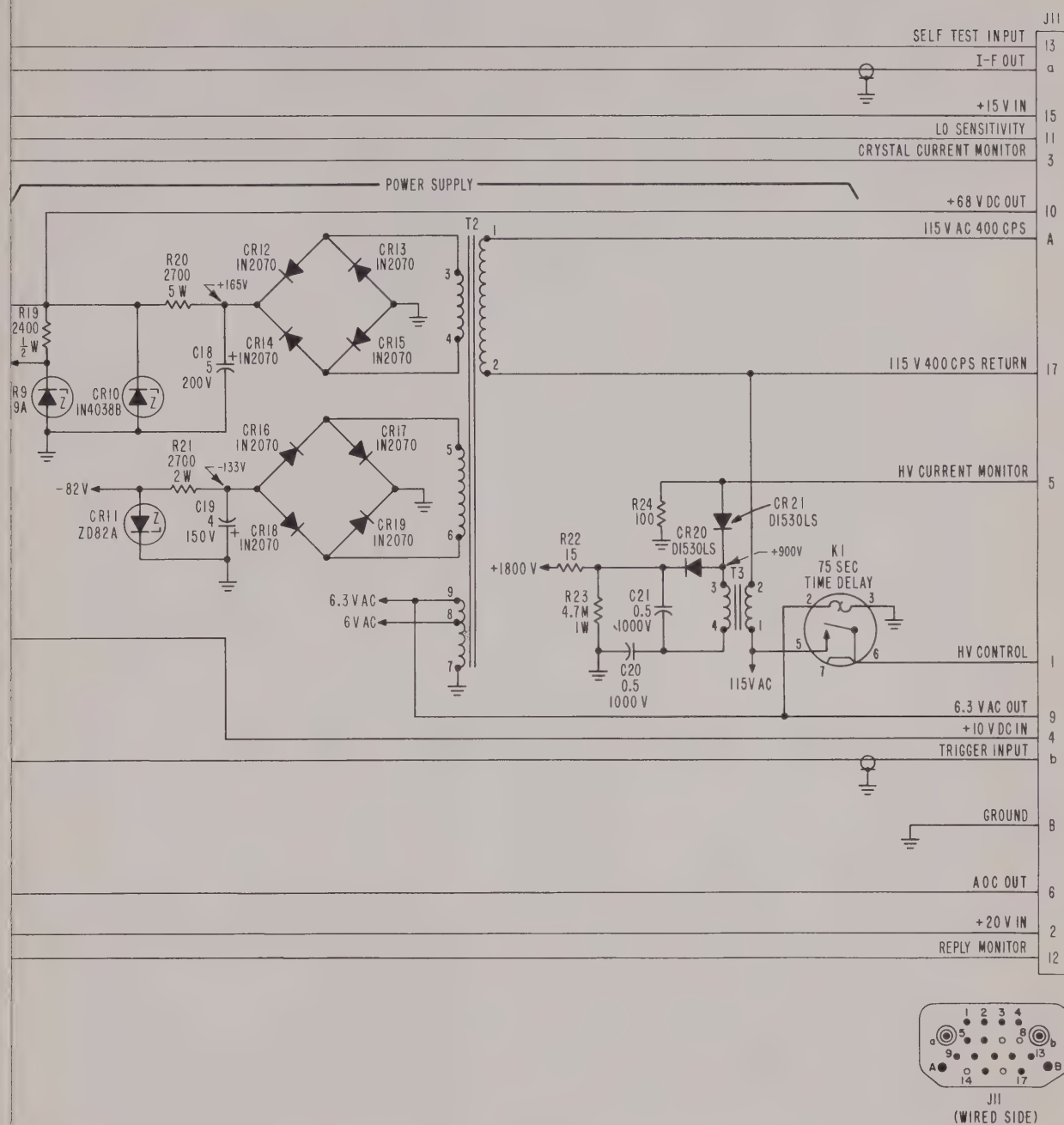
Figure 6-11. CO-105A Coder, Self-test Assembly A4, Schematic Diagram

Figure 6-12. CO-105A Coder, Self-test Assembly A4, Wiring Diagram

Figure 6-13. CO-105A Coder, Assembly Intraconnection Diagram

Figure 6-14. C-105B Control Unit, Schematic Diagram

Figure 6-15. C-105B Control Unit, Wiring Diagram



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Figure 6-1. RT-105A Receiver-Transmitter, Schematic Diagram

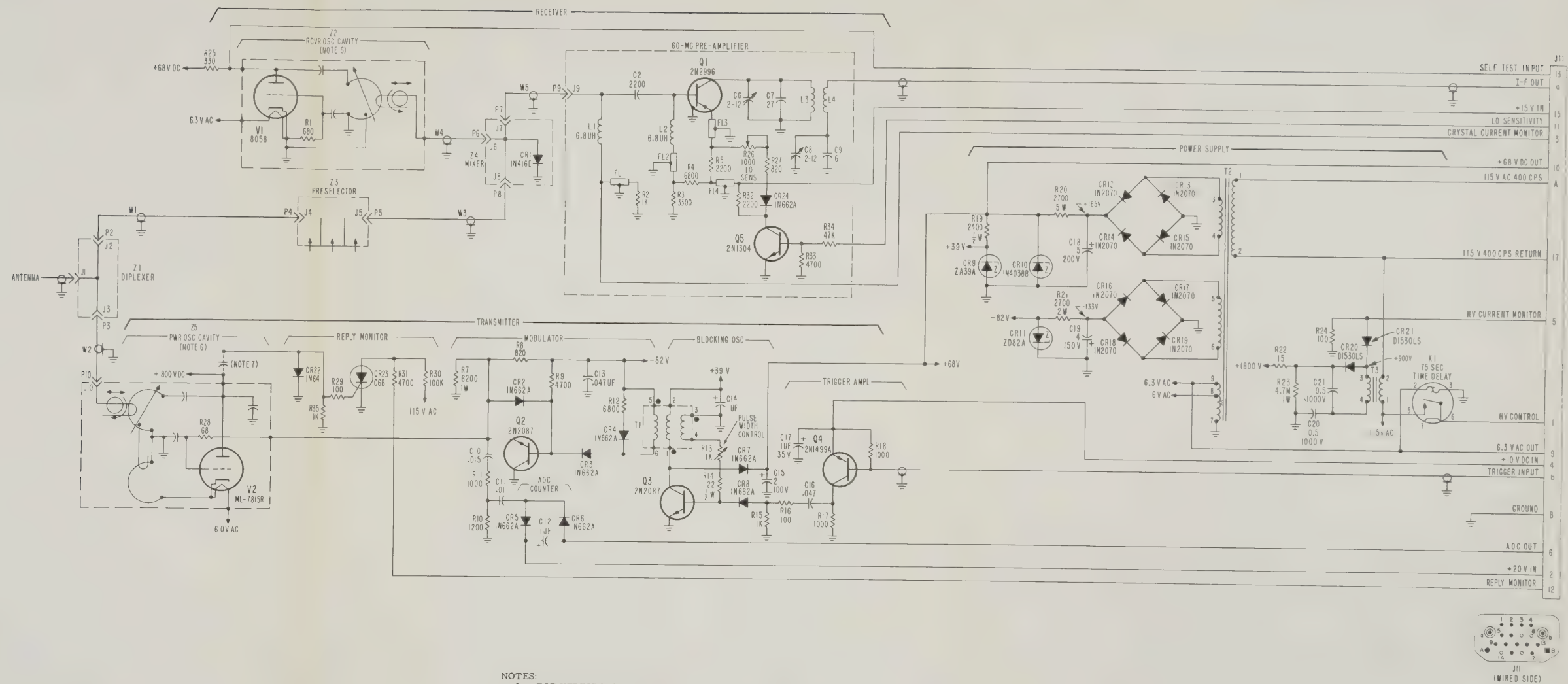
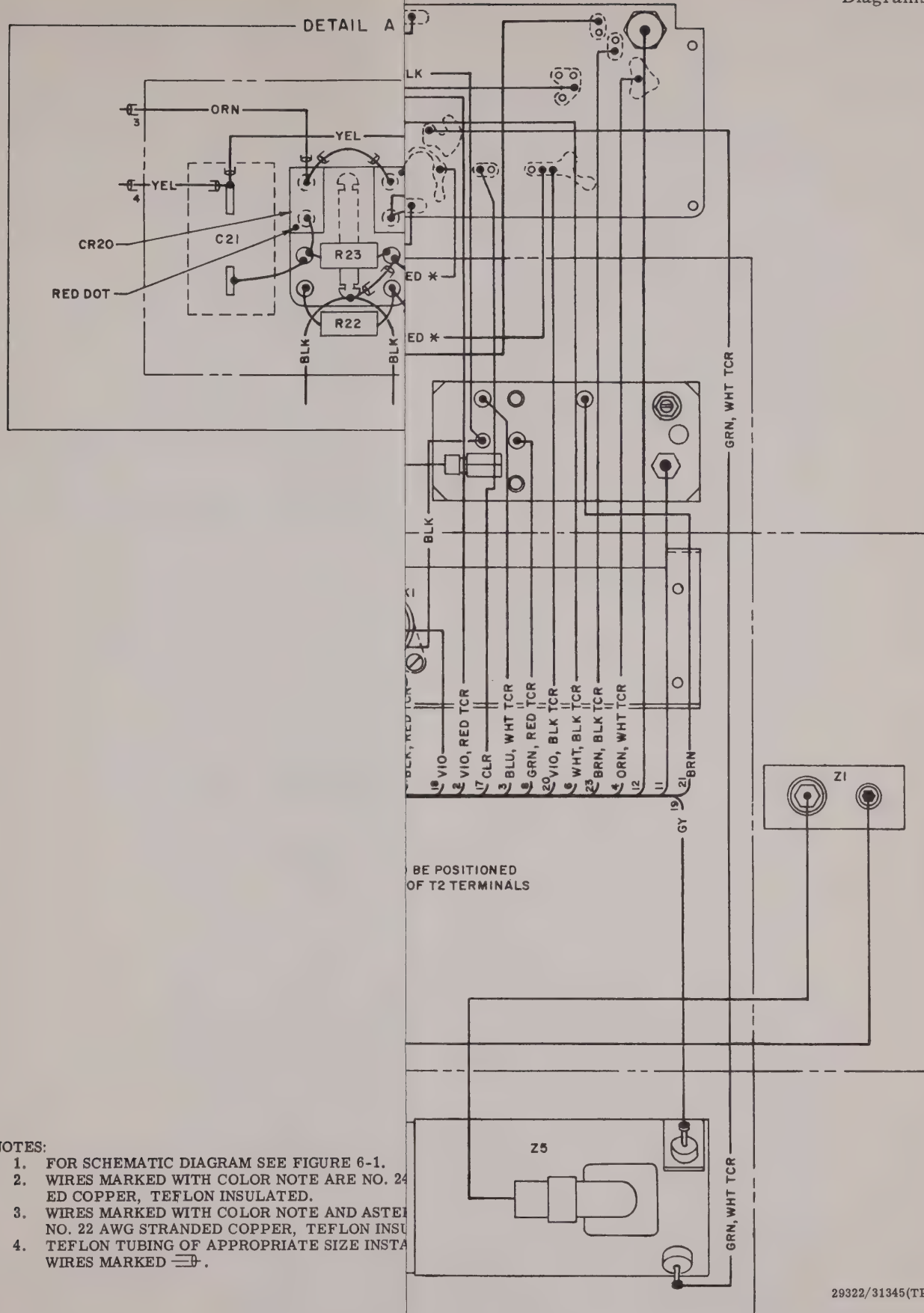


Figure 6-1. RT-105A Receiver-Transmitter, Schematic Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-1.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 24 ED COPPER, TEFLON INSULATED.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK ARE NO. 22 AWG STRANDED COPPER, TEFLON INSULATED.
4. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED WITH COLOR NOTE AND ASTERISK.

Figure 6-2. RT-105A Receiver-Transmitter, Main Chassis, Wiring Diagram

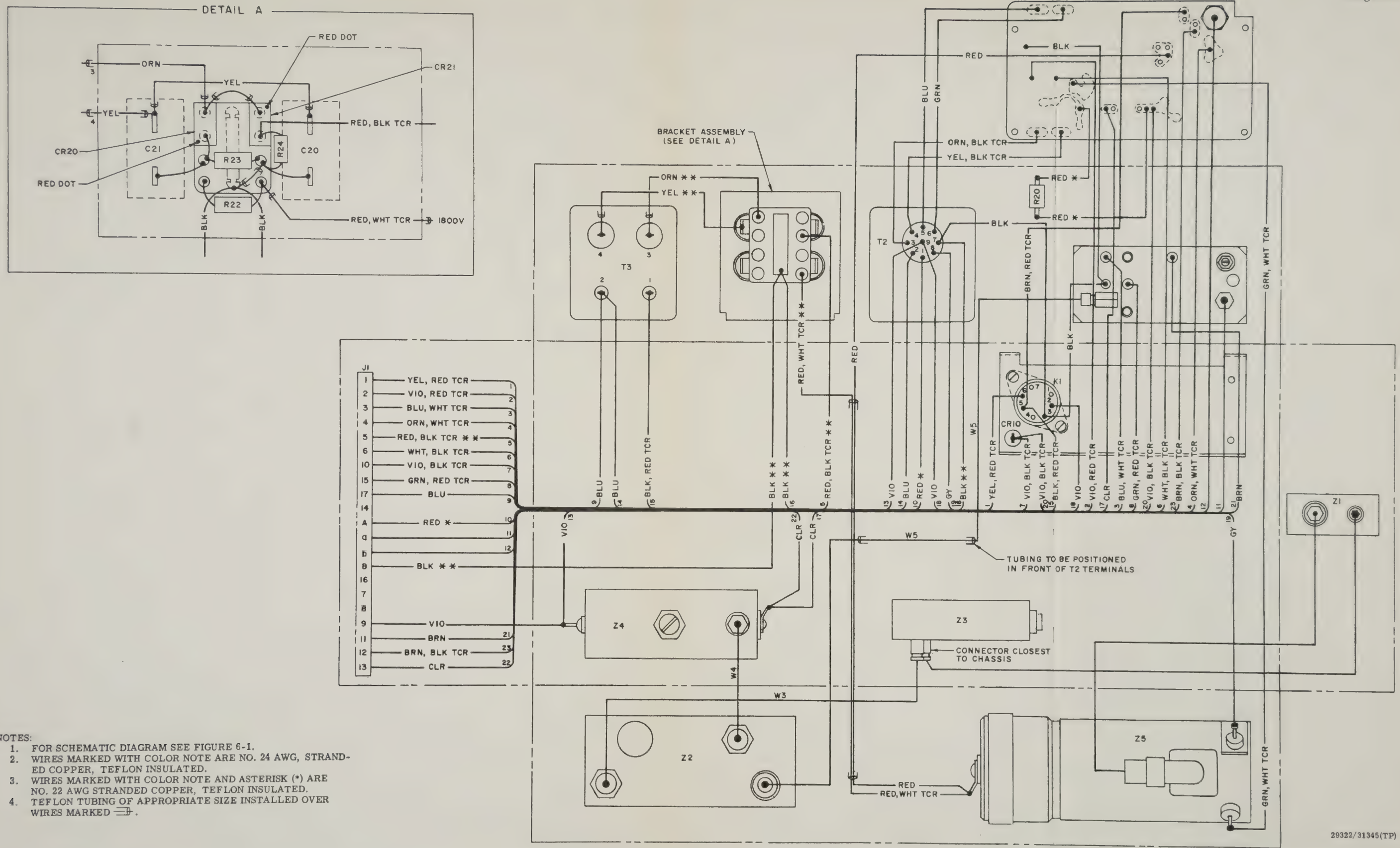
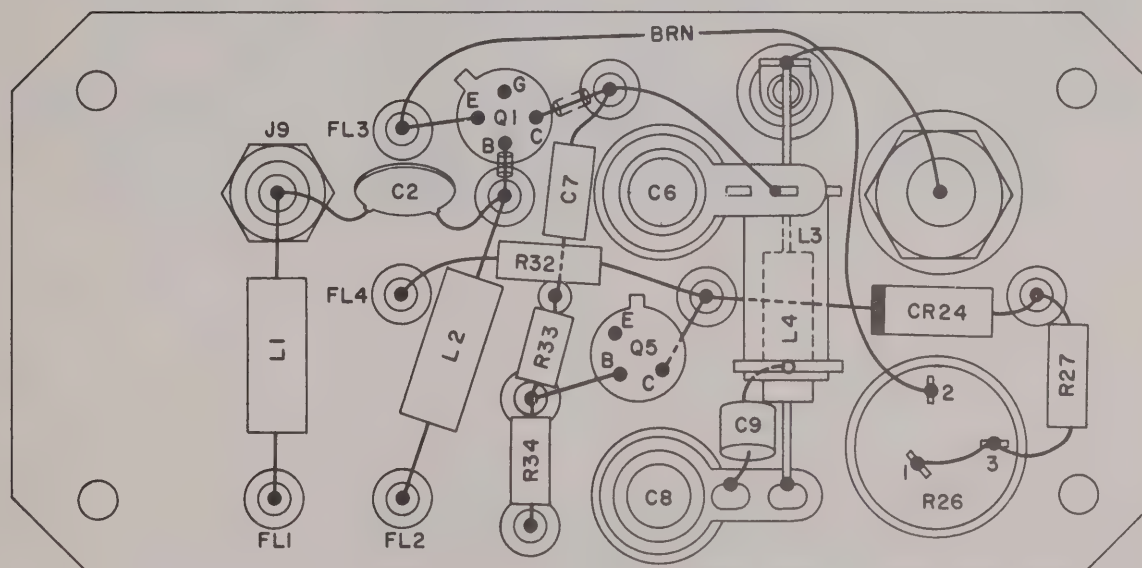
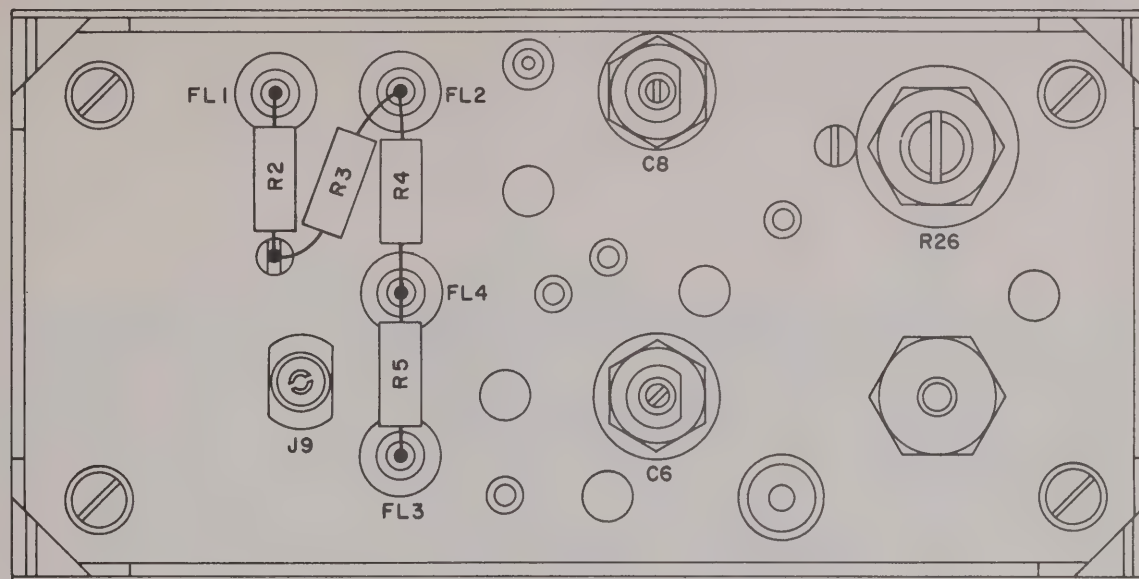


Figure 6-2. RT-105A Receiver-Transmitter, Main Chassis, Wiring Diagram

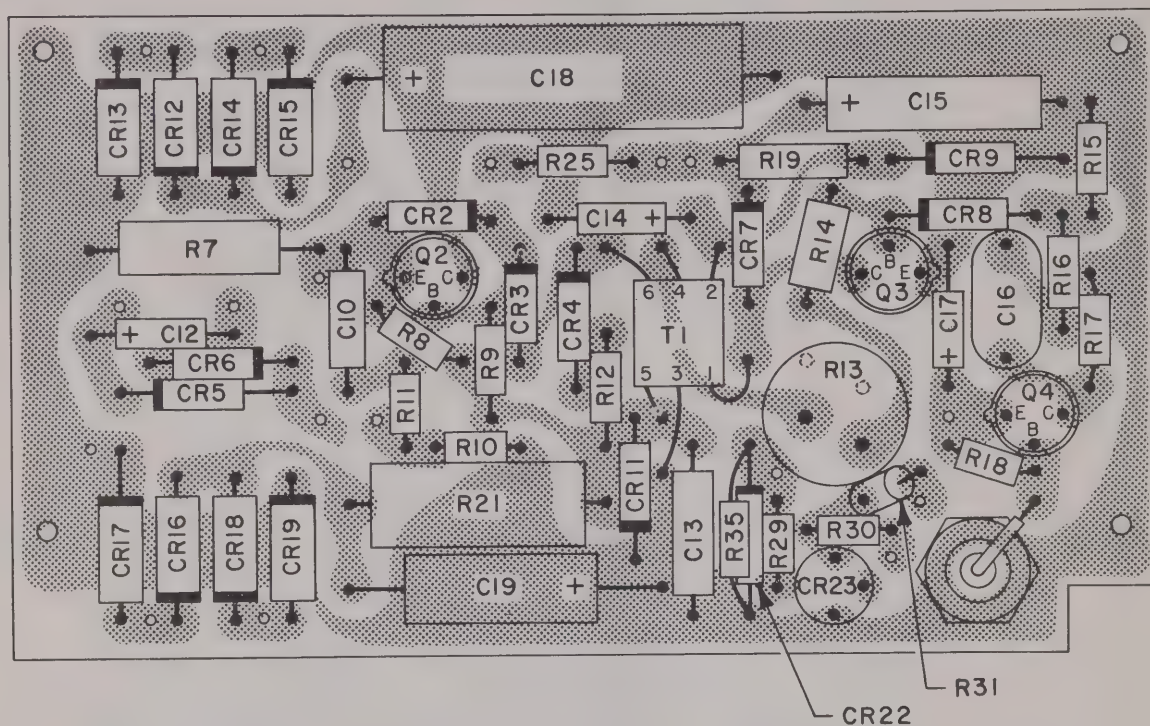


NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-1.
2. WIRE MARKED WITH COLOR NOTE IS NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
3. UNMARKED WIRES ARE NO. 24 AWG SOLID, TINNED COPPER.

Figure 6-3. RT-105A Receiver-Transmitter, 60-mc Preamplifier Assembly, Wiring Diagram

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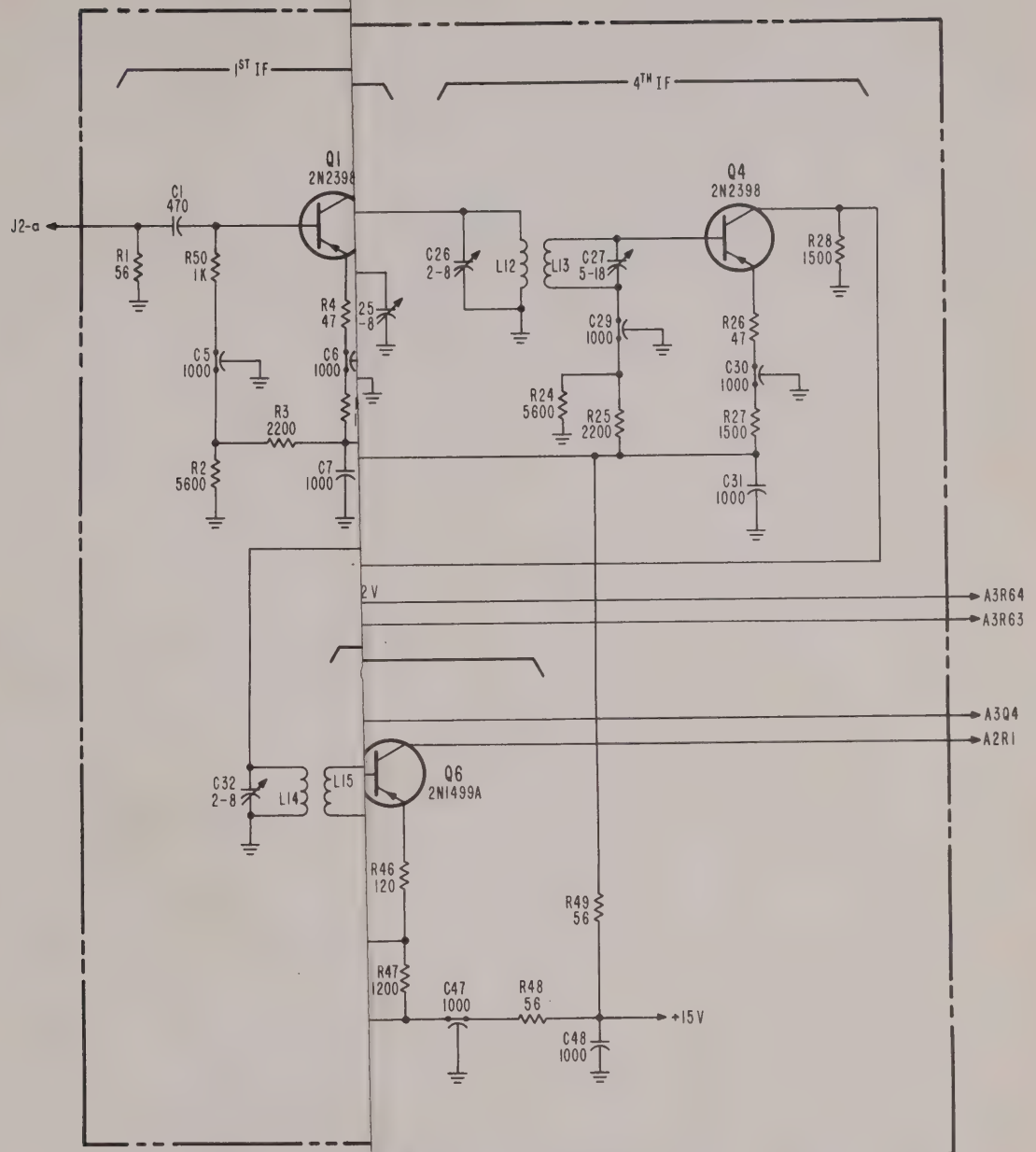


NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-1.
2. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

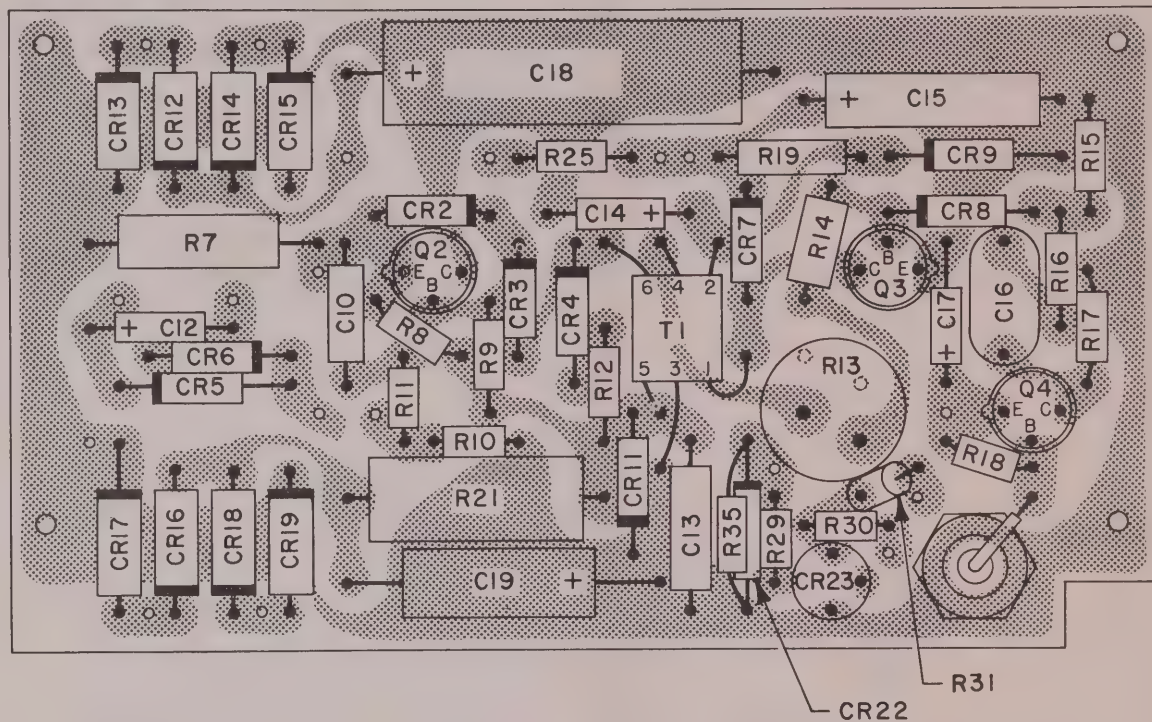
Figure 6-4. RT-105A Receiver-Transmitter, Printed-circuit Assembly, Wiring Diagram

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Figure 6-5. CO-105A Coder, I-f Amplifier-Detector Assembly A1, Schematic Diagram

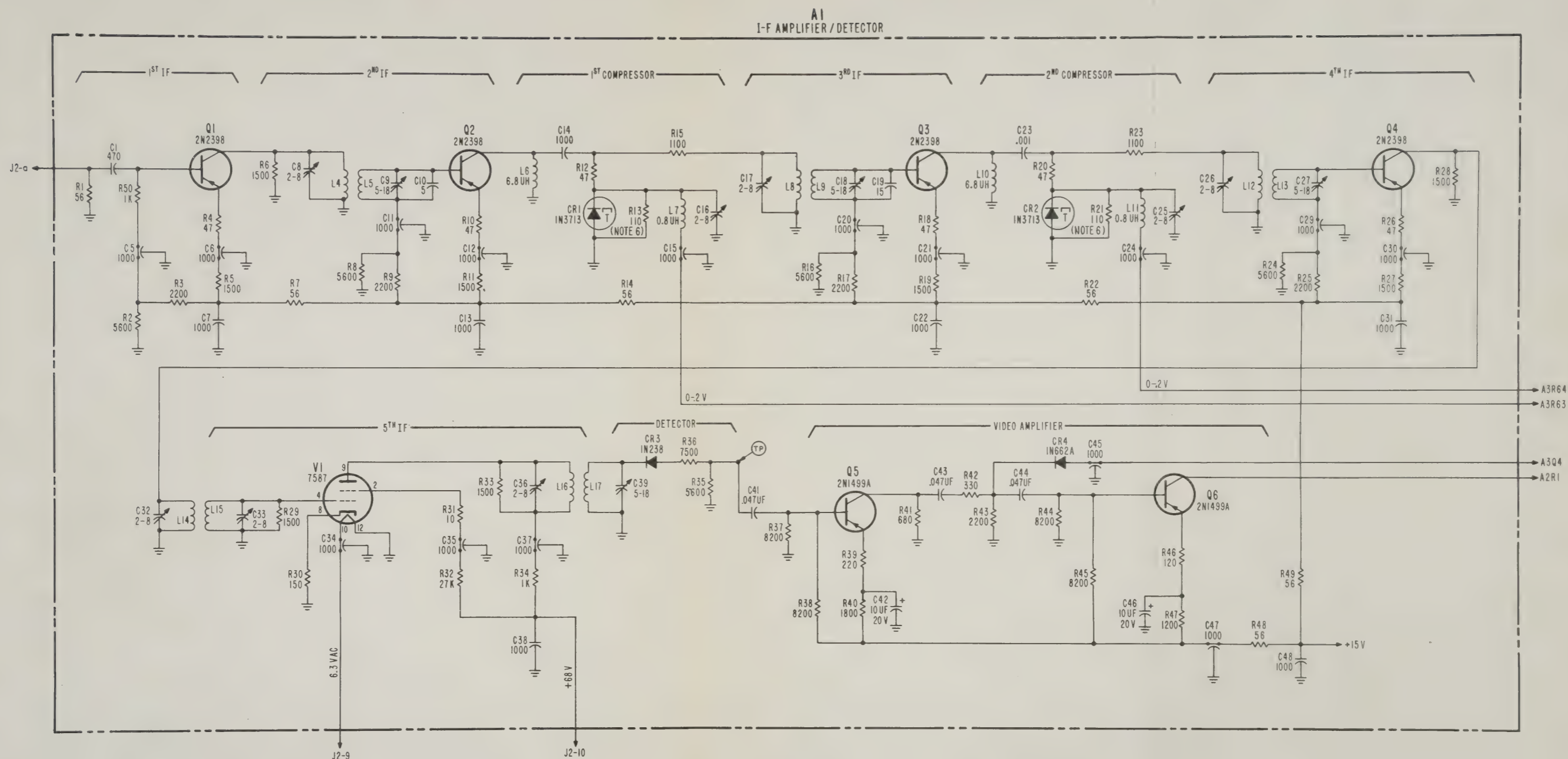


NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-1.
2. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

Figure 6-4. RT-105A Receiver-Transmitter, Printed-circuit Assembly, Wiring Diagram

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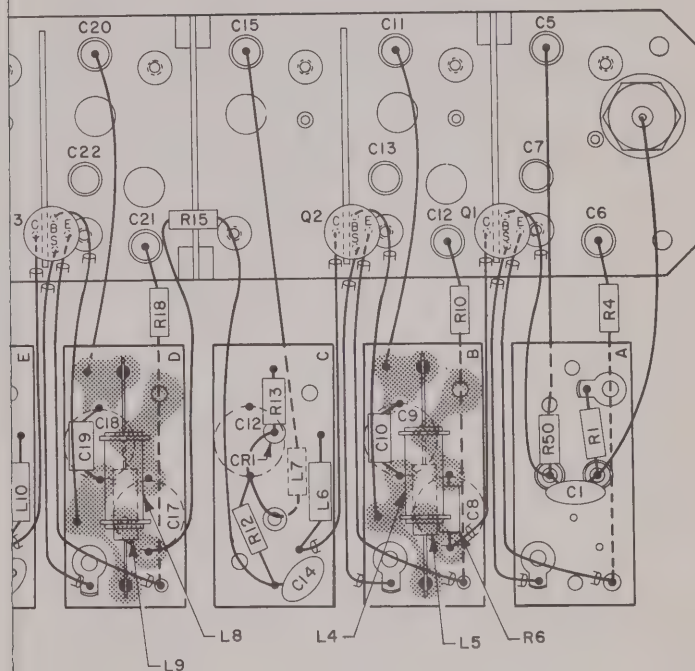


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A1; FOR EXAMPLE: A1R1, A1C1.
2. TO COMPLETE CODER SCHEMATIC DIAGRAM, SEE FIGURES 6-7, 6-9, AND 6-11.
3. FOR WIRING DIAGRAM, SEE FIGURE 6-6.
4. RESISTOR VALUES ARE IN OHMS. MULTIPLIER: K=1000.
5. CAPACITOR VALUES ARE IN PICOFARADS (pF), UNLESS OTHERWISE NOTED.
6. VALUE OF TUNNEL DIODE LOAD RESISTORS A1R13 AND A1R21 DETERMINED DURING FINAL FACTORY ADJUSTMENT.

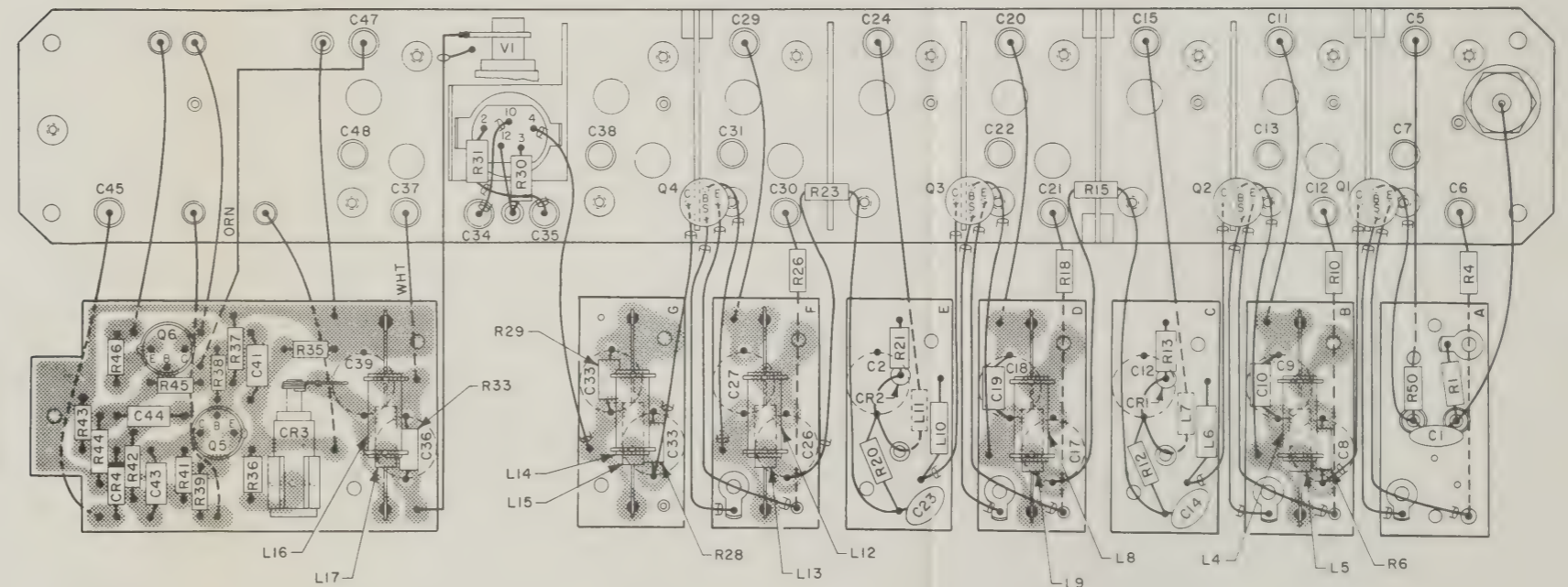
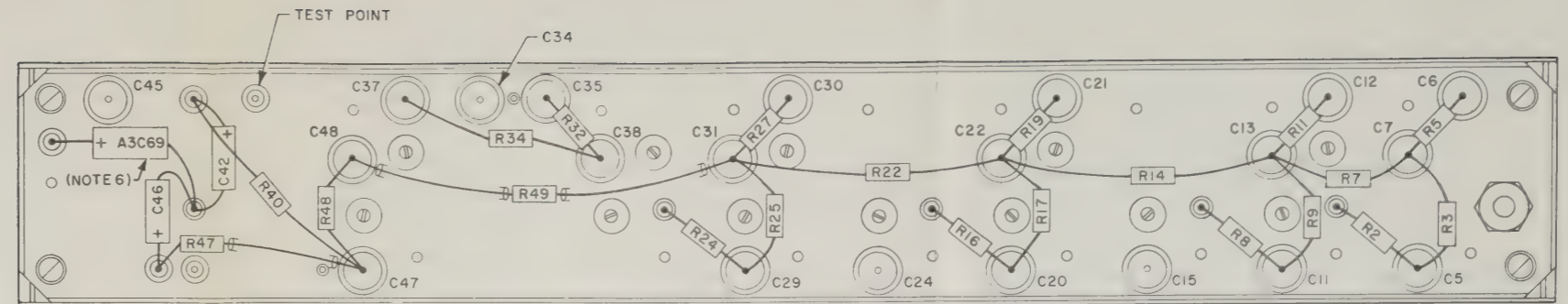
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Figure 6-5. CO-105A Coder, I-f Amplifier-Detector Assembly A1, Schematic Diagram




MOUNTED ON ASSEMBLY A1 FOR CON-

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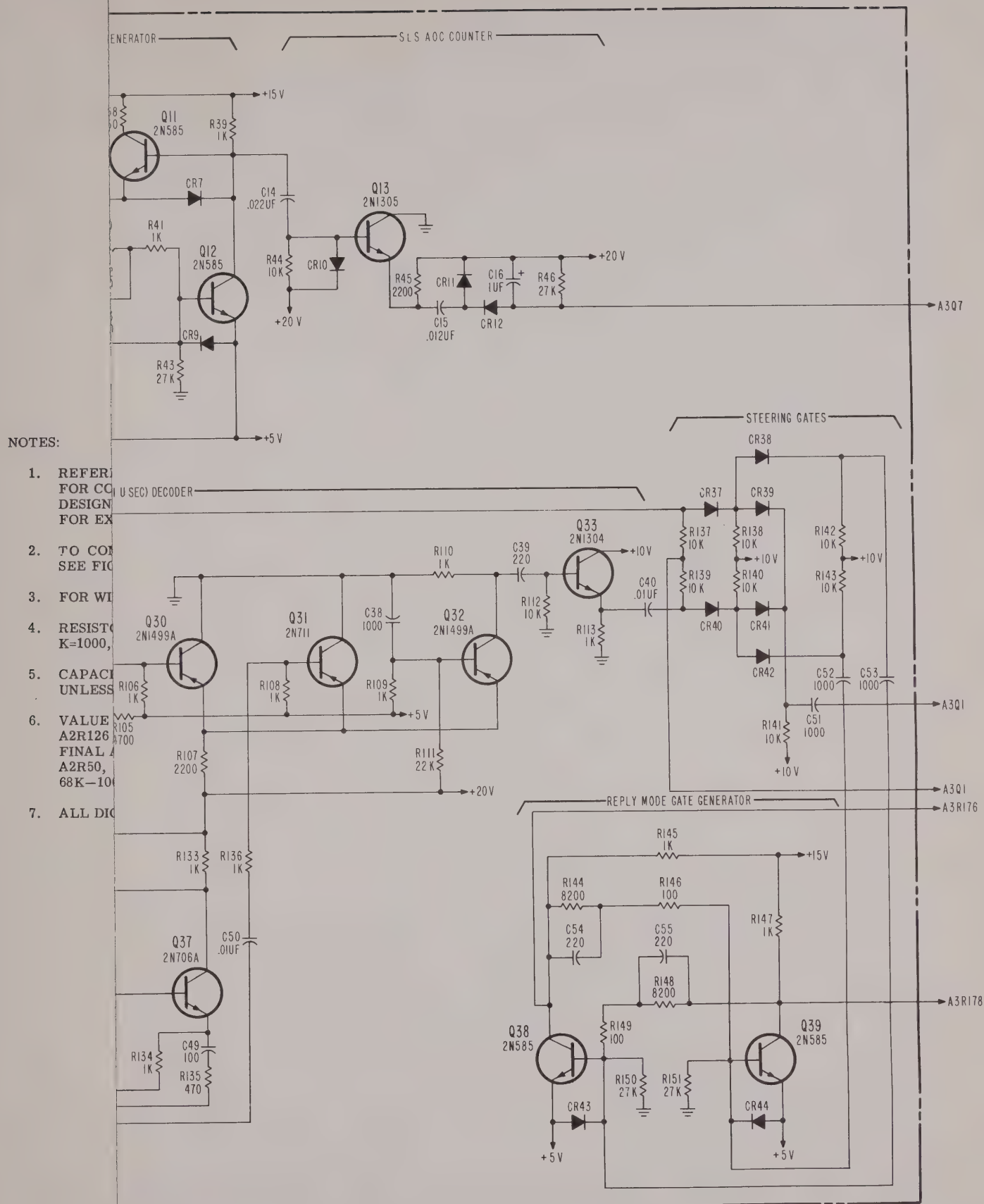


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A1; FOR EXAMPLE: A1C1.
2. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-5.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED. UNMARKED WIRES ARE NO. 24 AWG, BARE, SOLID, TINNED COPPER.
4. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED .
5. PRINTED CIRCUIT ASSEMBLIES ARE SHOWN DISPLACED FOR CLARITY. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.
6. CAPACITOR A3C69, ELECTRICALLY PART OF ASSEMBLY A3, IS MOUNTED ON ASSEMBLY A1 FOR CONVENIENCE.

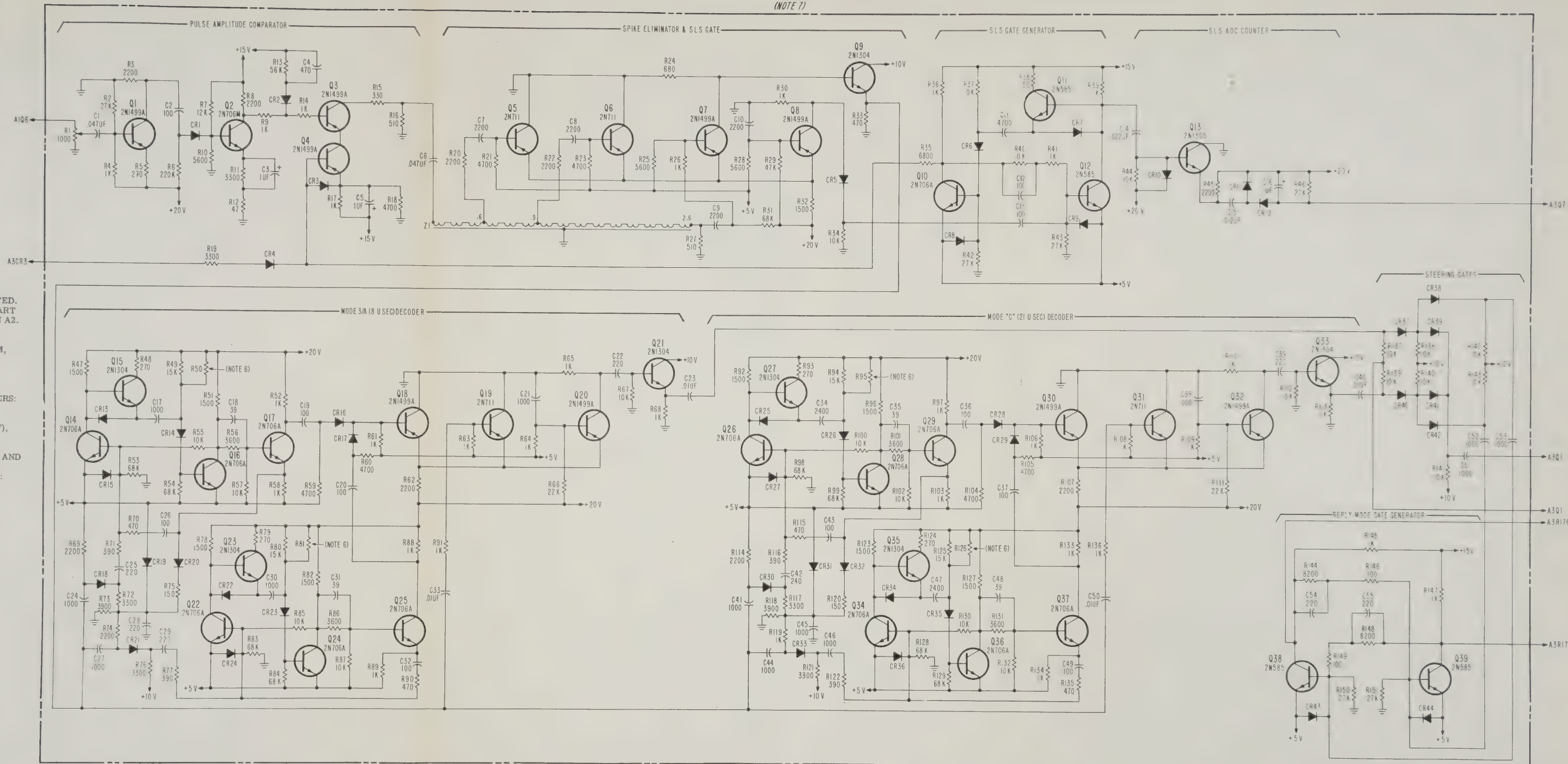
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Figure 6-6. CO-105A Coder, I-f Amplifier-Detector Assembly A1, Wiring Diagram



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Figure 6-7. CO-105A Coder, Decoder Assembly A2, Schematic Diagram

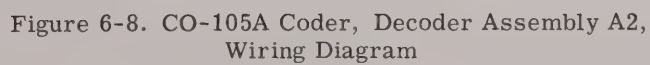
A2
DECODER
(NOTE 7)

NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A2. FOR EXAMPLE: A2R1, A2Q1.
2. TO COMPLETE CODER SCHEMATIC DIAGRAM, SEE FIGURES 6-5, 6-9, AND 6-11.
3. FOR WIRING DIAGRAM, SEE FIGURE 6-8.
4. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K=1000, M=1,000,000.
5. CAPACITOR VALUES ARE IN PICO FARADS (pF), UNLESS OTHERWISE NOTED.
6. VALUE OF RESISTORS A2R50, A2R81, A2R95, AND A2R126 SELECTED AND INSTALLED DURING FINAL ADJUSTMENT. LIMITING VALUES ARE: A2R50, A2R81: 47K-68K. A2R95, A2R126: 68K-100K.
7. ALL DIODES ARE TYPE 1N662A.

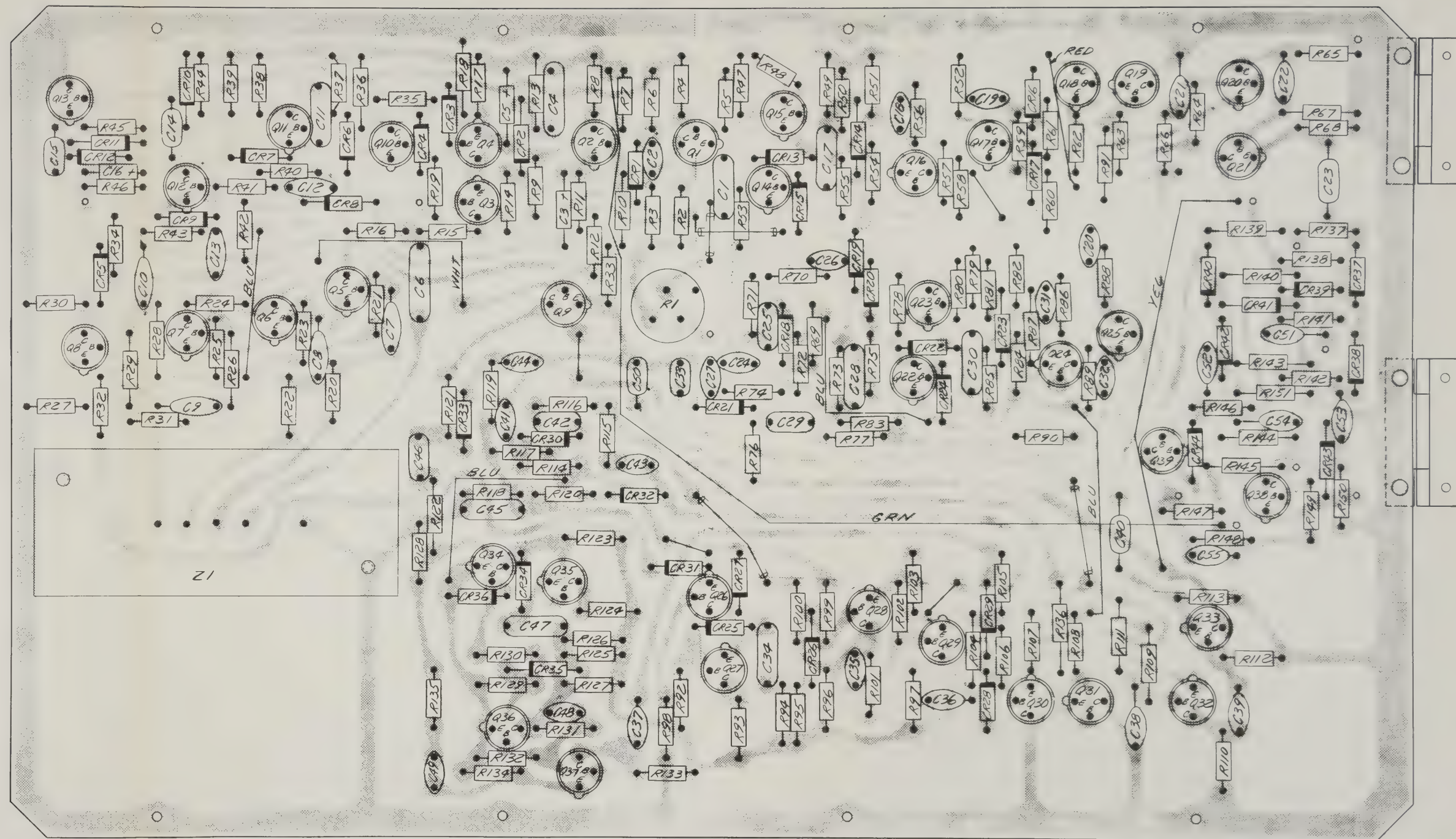
Figure 6-7. CO-105A Coder, Decoder Assembly A2, Schematic Diagram

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NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A2. FOR EXAMPLE: A2C1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-7.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG, STRANDED COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG, BARE, SOLID, TINNED COPPER.
5. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED \equiv .
6. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.



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Figure 6-8. CO-105A Coder, Decoder Assembly A2, Wiring Diagram

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NOTES:

1. REFERENCE DESIGNATION FOR COMPLETE IDENTIFICATION WITH ASSOCIATED FIGURE FOR EXAMPLE: A3C1.
2. TO COMPLETE CODER SEE FIGURES 6-5, 6-7, A
3. FOR WIRING DIAGRAM,
4. RESISTOR VALUES ARE K=1000, M=1,000,000.
5. CAPACITOR VALUES ARE UNLESS OTHERWISE NOTED.
6. VOLTAGE OUTPUT IS APPROXIMATELY +0.125 VOLT.
7. ALL DIODES ARE TYPE A3CR9-A3CR13. A3CR9-1N751 ZENER DIODES; A3

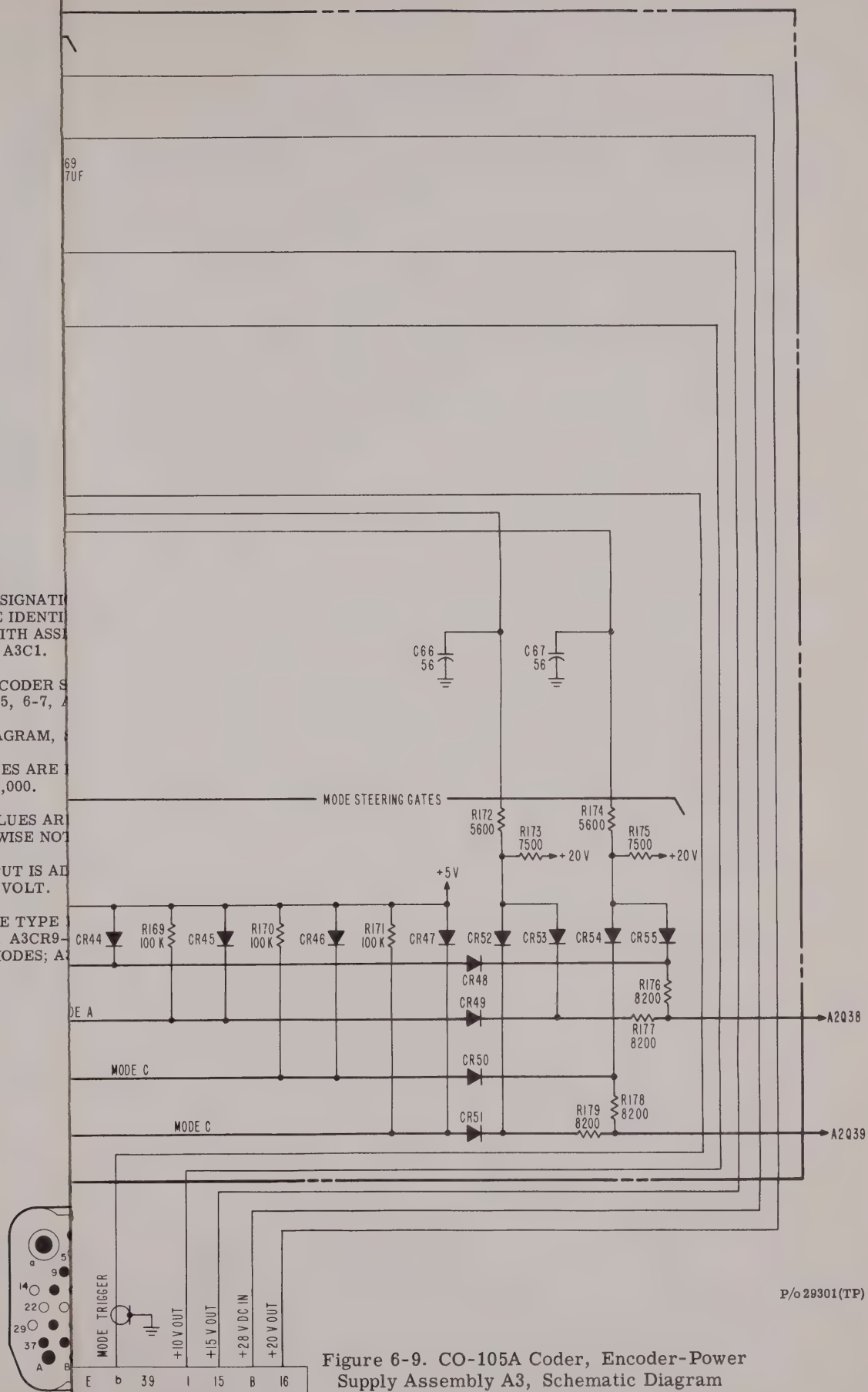
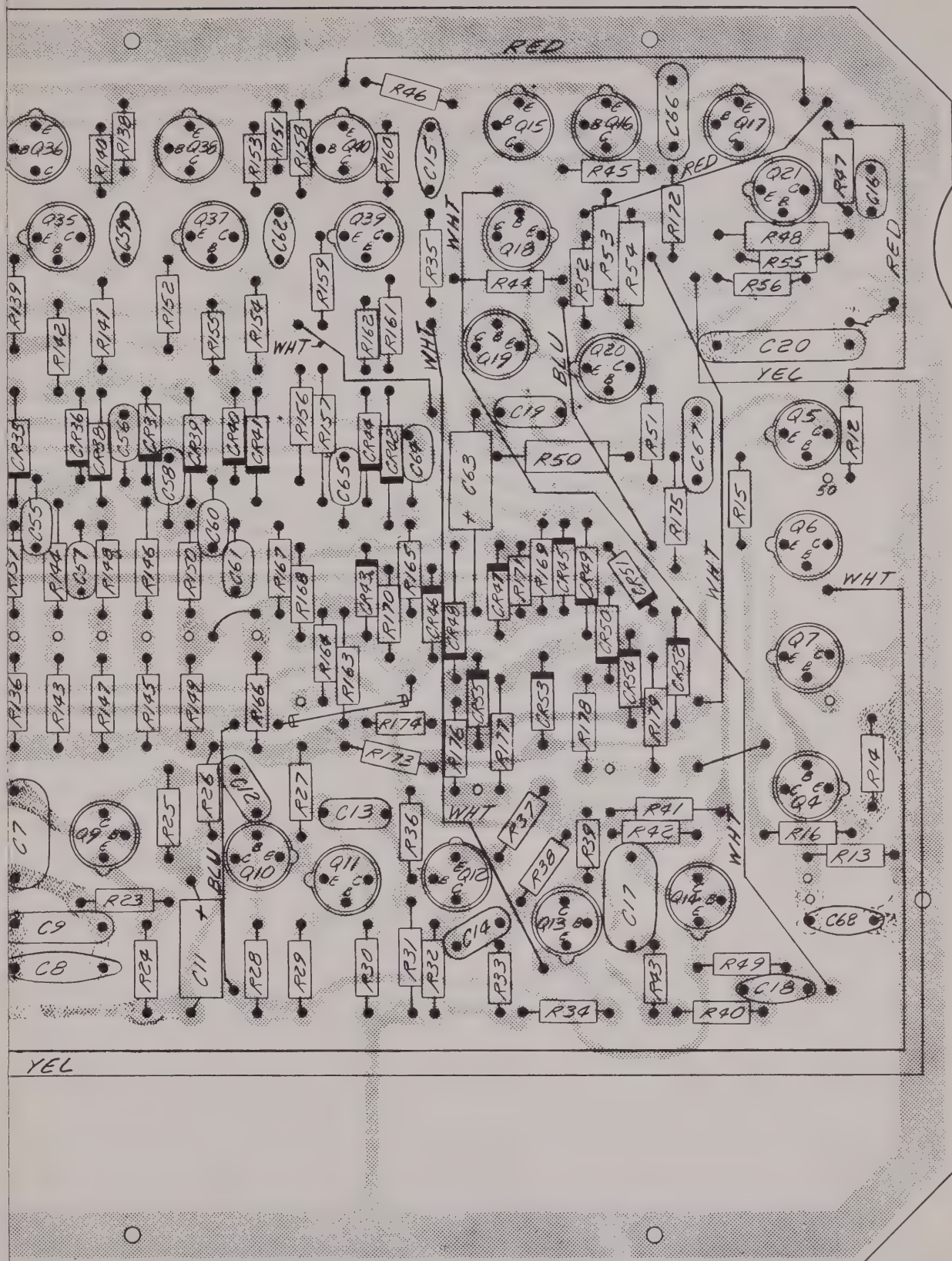


Figure 6-9. CO-105A Coder, Encoder-Power Supply Assembly A3, Schematic Diagram



Figure 6-9. CO-105A Coder, Encoder-Power Supply Assembly A3, Schematic Diagram



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Figure 6-10. CO-105A Encoder-Power Supply Assembly A3,
Wiring Diagram

NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A3. FOR EXAMPLE: A3C1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-9.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG, STRANDED COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG, BARE, SOLID, TINNED COPPER.
5. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED \equiv .
6. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

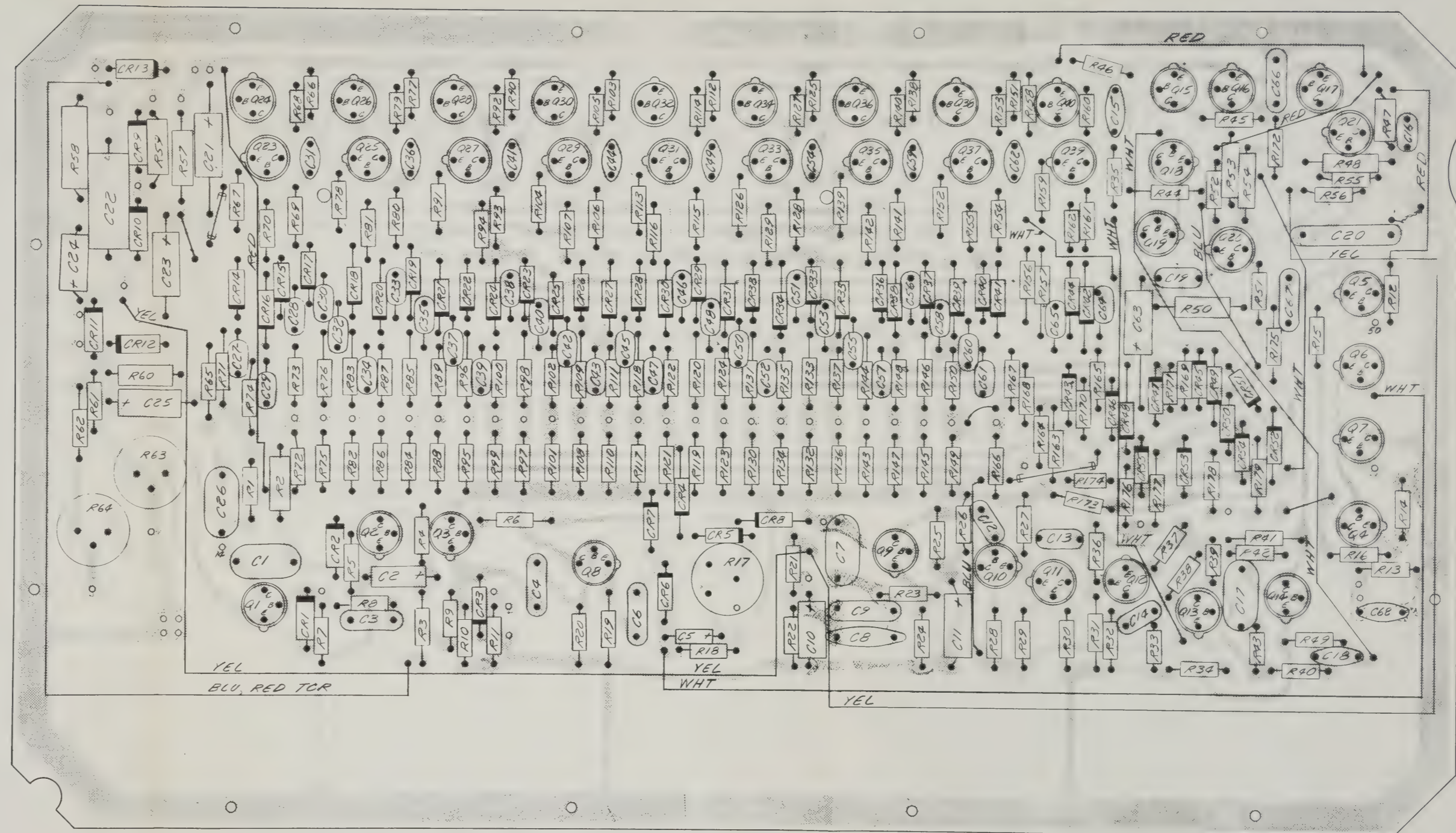
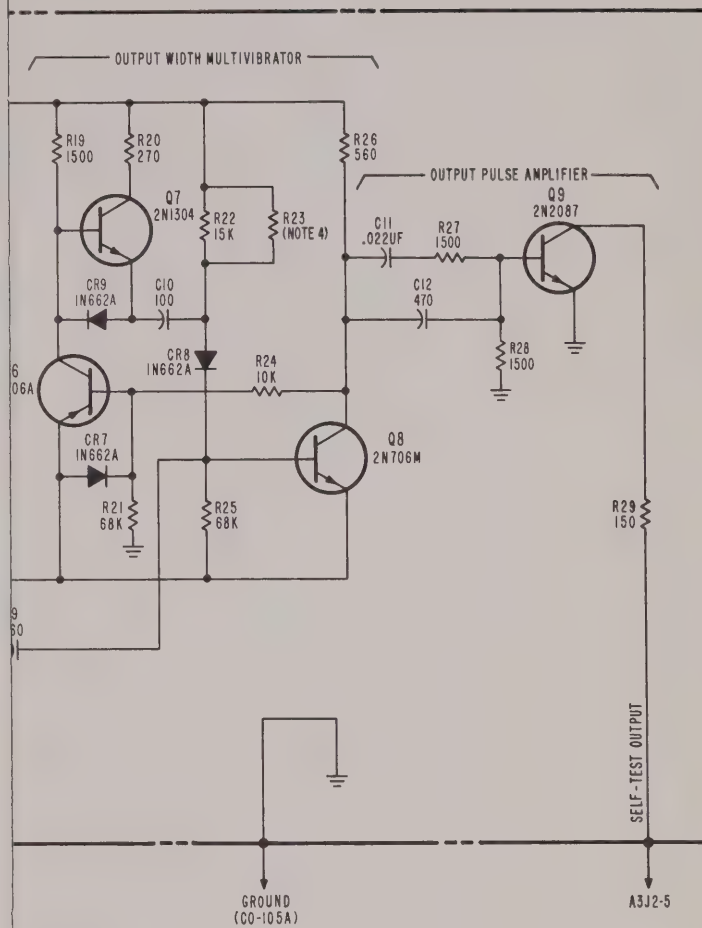


Figure 6-10. CO-105A Coder, Encoder-Power Supply Assembly A3, Wiring Diagram



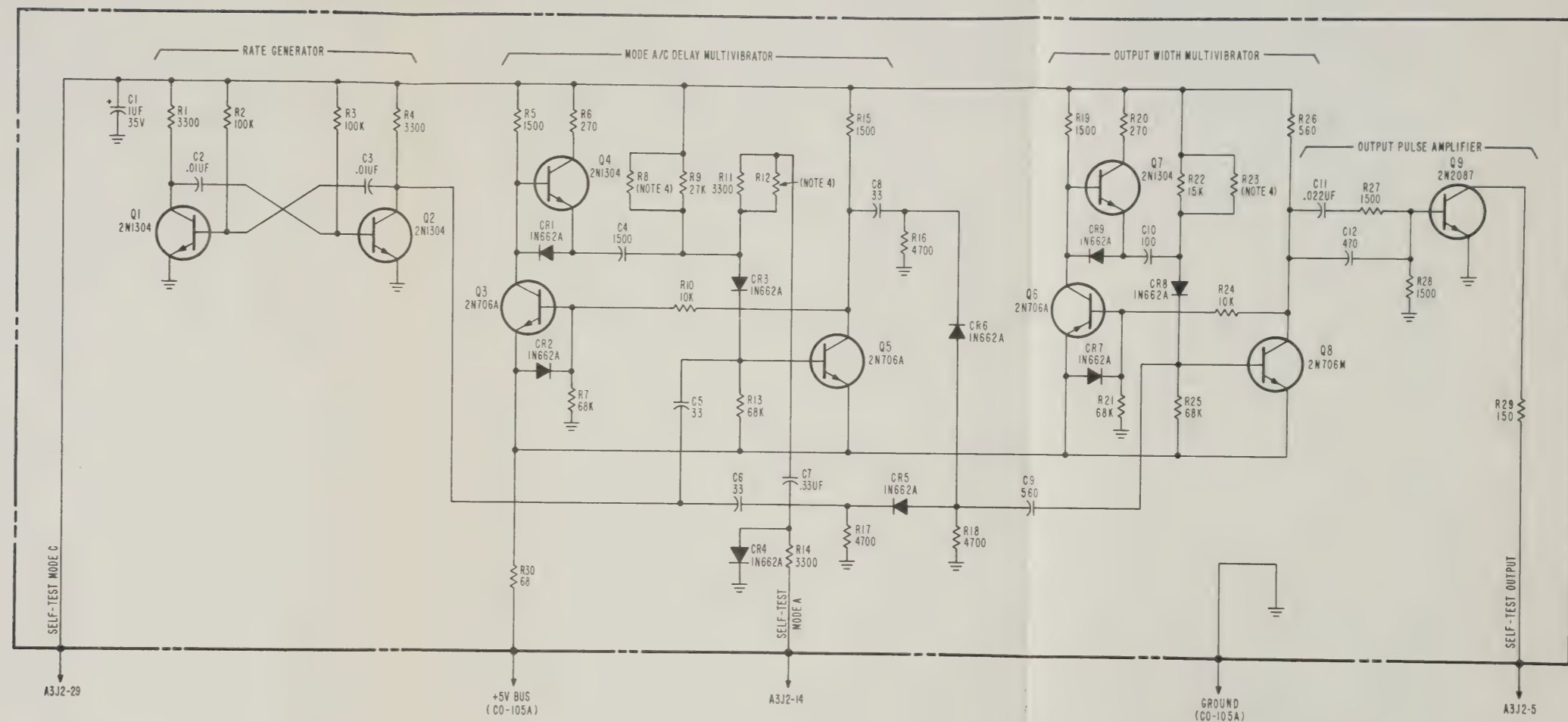
IFICATION PRE-
LE: A4C1.
D 6-9.

FINAL ADJUST-

ED.

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Figure 6-11. CO-105A Coder, Self-test
Assembly A4, Schematic Diagram

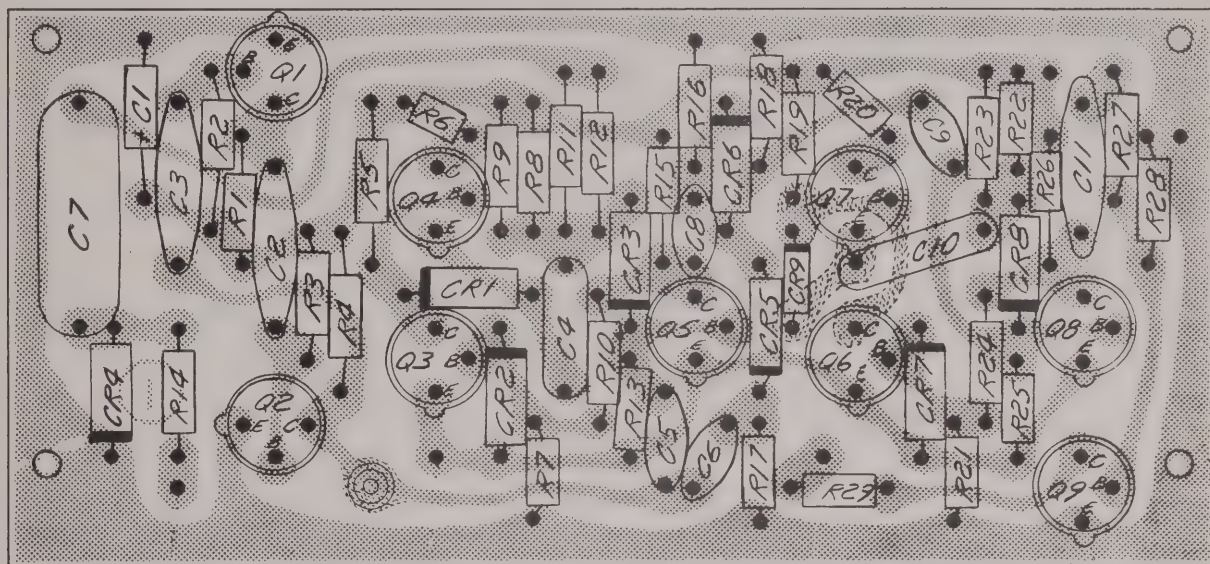


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A4. FOR EXAMPLE: A4C1.
2. TO COMPLETE CODER SCHEMATIC DIAGRAM, SEE FIGURE 6-5, 6-7, AND 6-9.
3. FOR WIRING DIAGRAM SEE FIGURE 6-12.
4. VALUE OF A4R8, A4R12, AND A4R23 SELECTED AND INSTALLED DURING FINAL ADJUSTMENT. LIMITING VALUES ARE:
A4R8: 56K-100K
A4R12: 4700-22K
A4R23: 39K-82K
5. CAPACITOR VALUES ARE IN PICOFARADS (pF), UNLESS OTHERWISE NOTED.

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Figure 6-11. CO-105A Coder, Self-test Assembly A4, Schematic Diagram

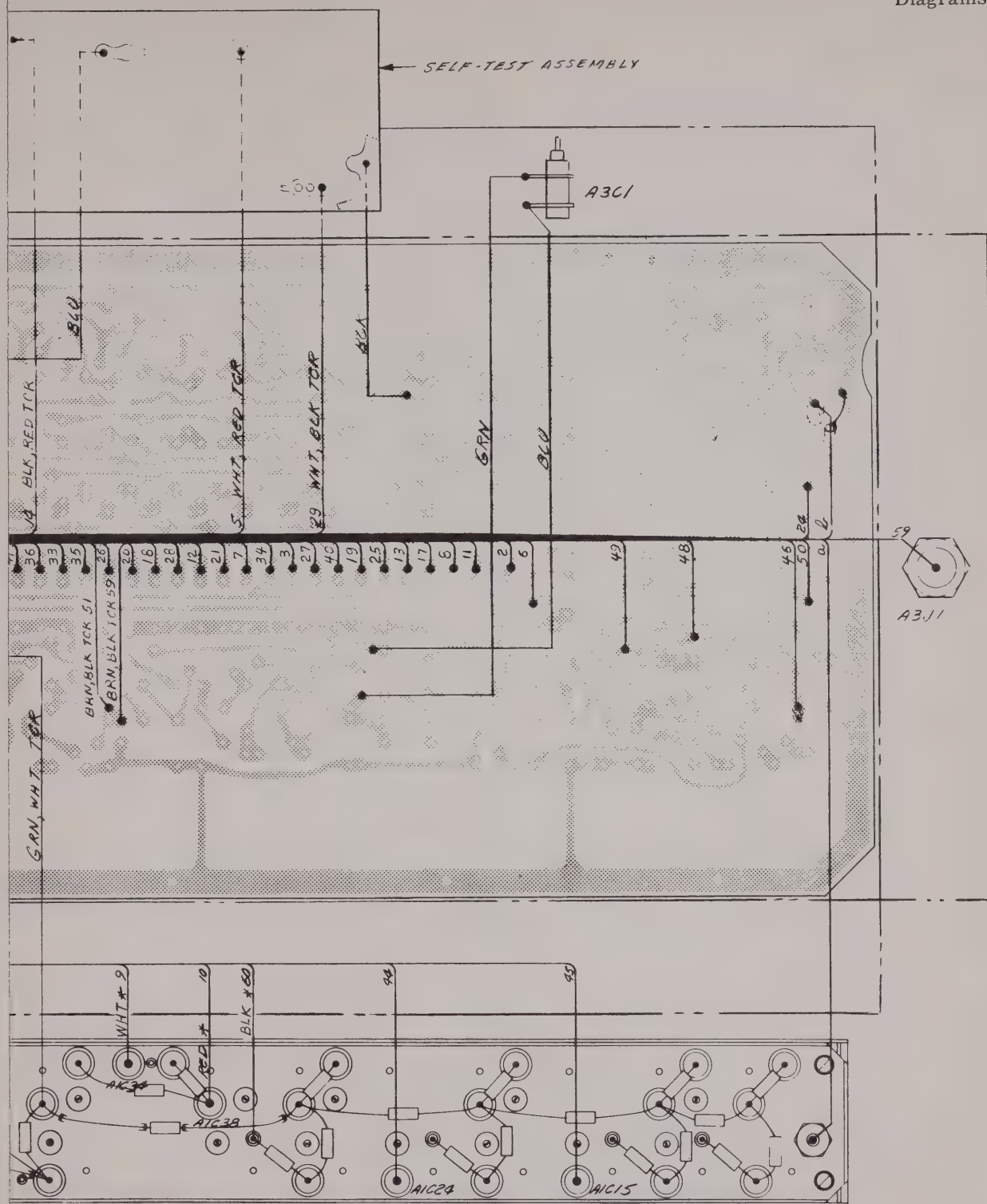


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION PREFIX PART DESIGNATION WITH ASSEMBLY DESIGNATION A4. FOR EXAMPLE: A4C1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-11.
3. WIRES ARE NO. 24 AWG, STRANDED COPPER, TEFLON INSULATED.
4. DOTTED PATTERN DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

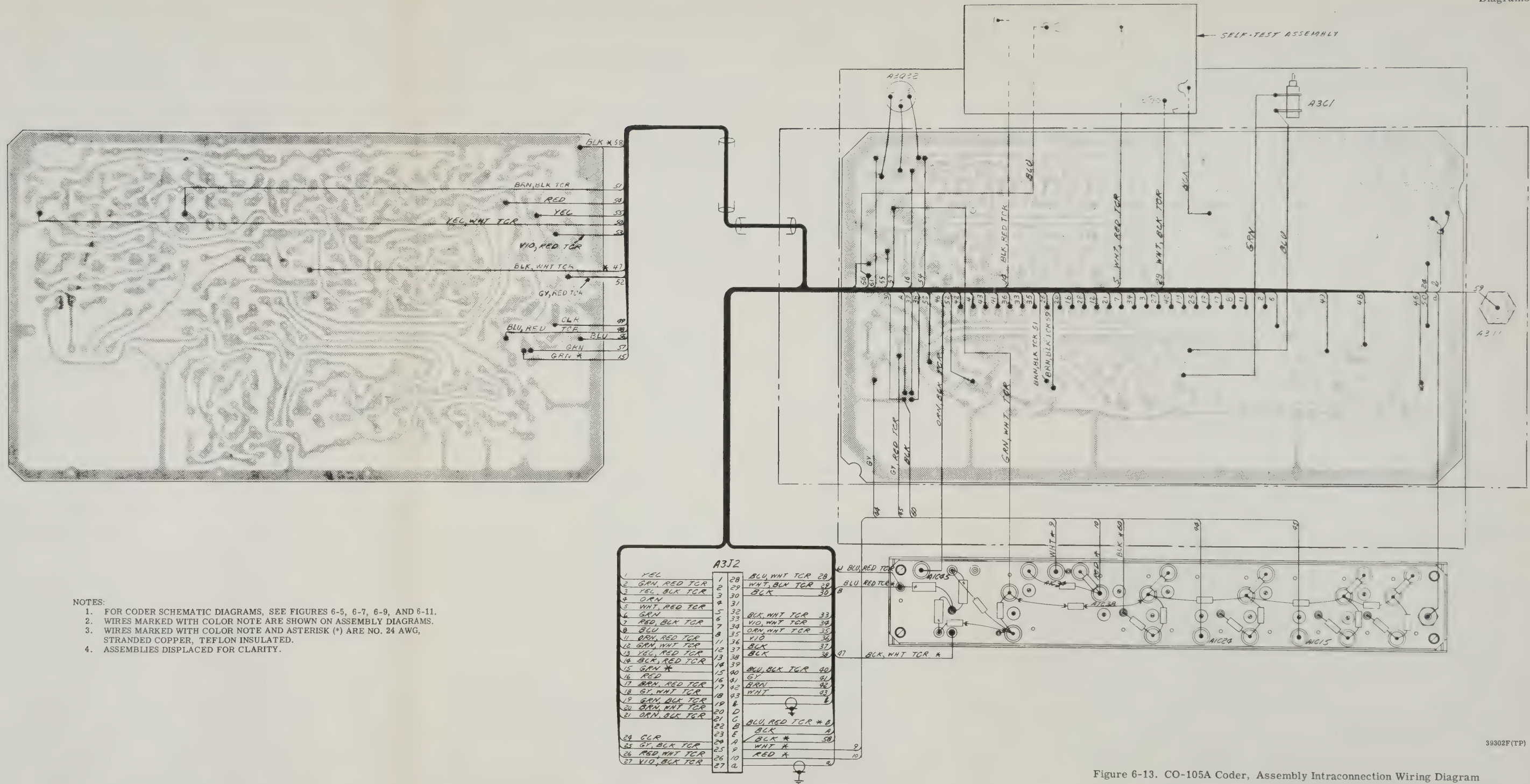
Figure 6-12. CO-105A Coder, Self-test Assembly A4, Wiring Diagram

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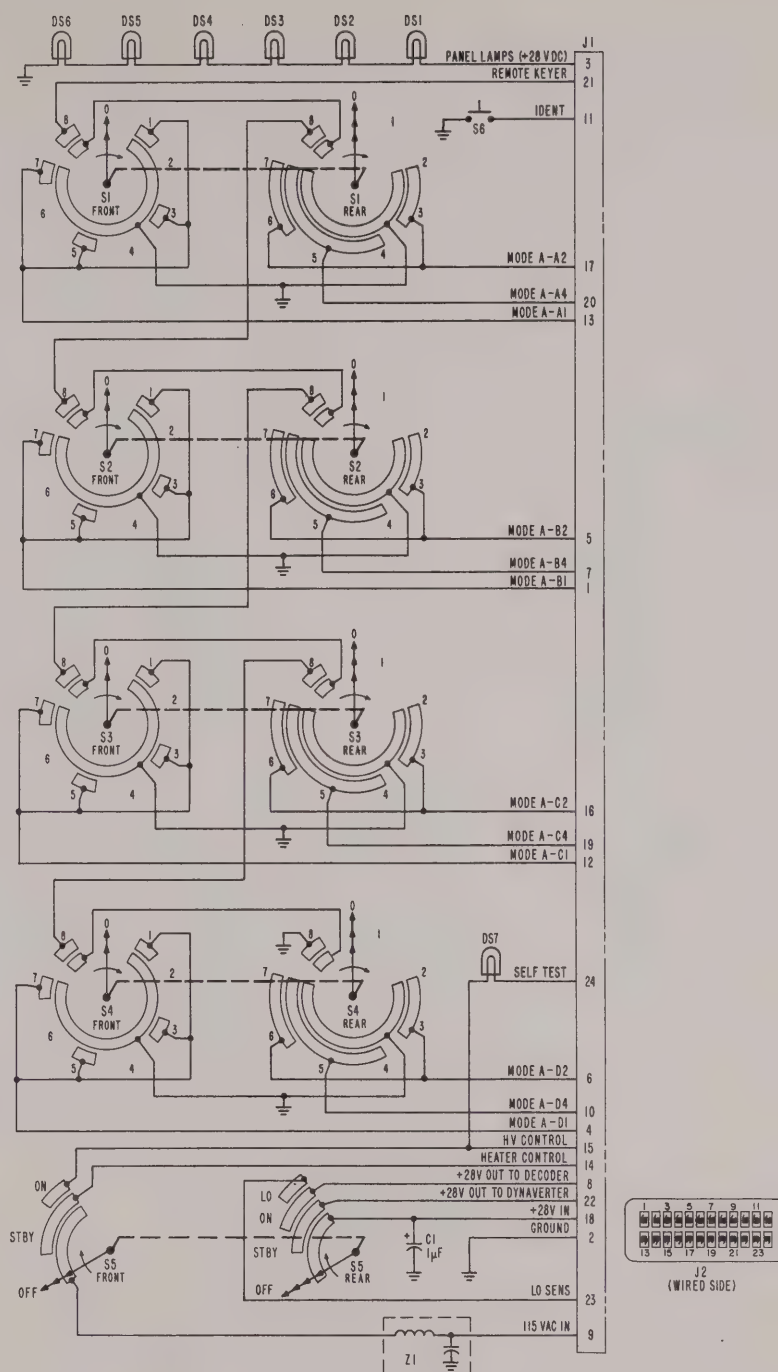


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Figure 6-13. CO-105A Coder, Assembly Intraconnection Wiring Diagram



- NOTES:
1. FOR CODER SCHEMATIC DIAGRAMS, SEE FIGURES 6-5, 6-7, 6-9, AND 6-11.
 2. WIRES MARKED WITH COLOR NOTE ARE SHOWN ON ASSEMBLY DIAGRAMS.
 3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 24 AWG, STRANDED COPPER, TEFLON INSULATED.
 4. ASSEMBLIES DISPLACED FOR CLARITY.

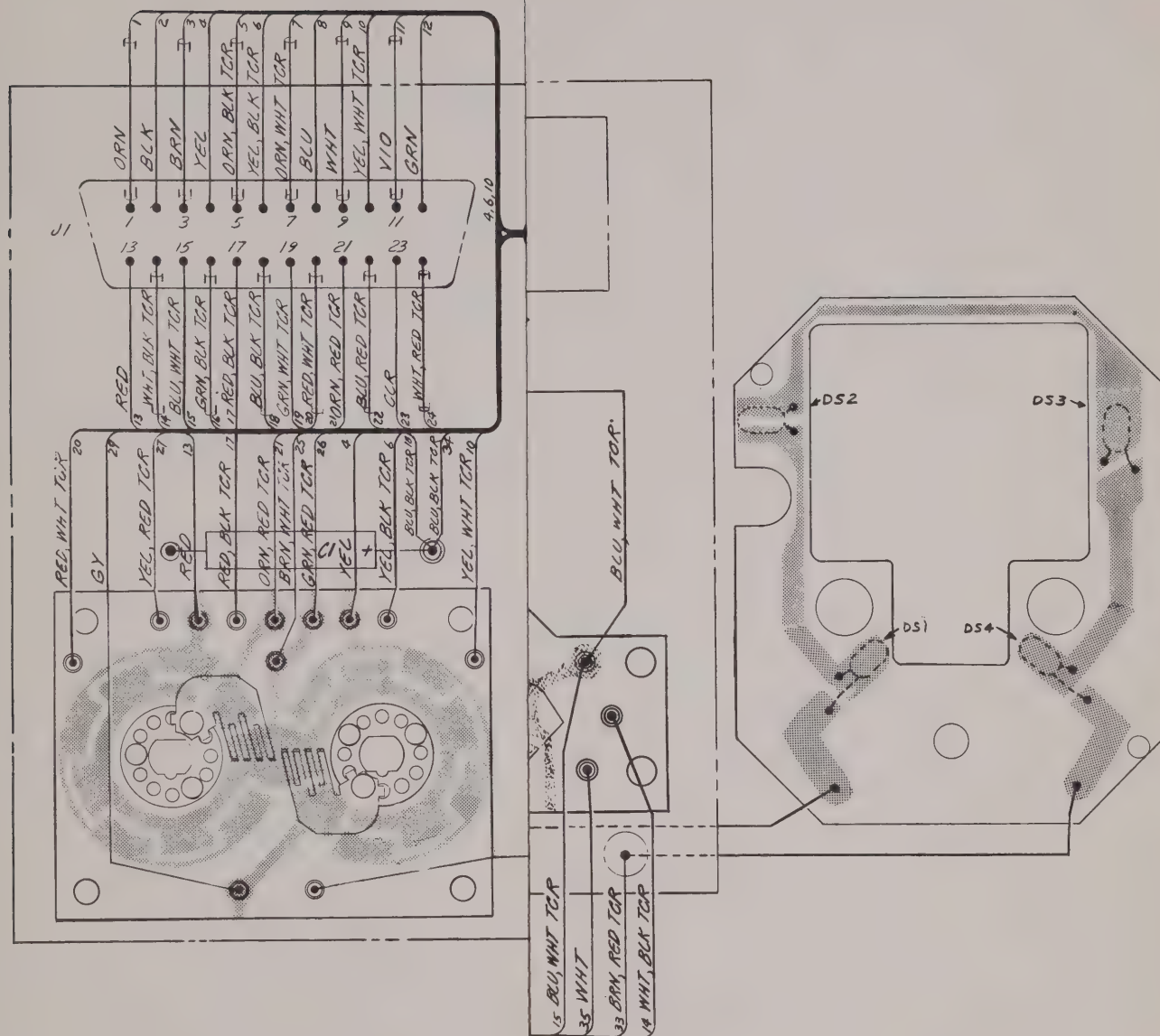


NOTES:

1. FOR WIRING, SEE FIGURE 6-15.
2. SWITCH SECTIONS ARE VIEWED FROM KNOB END OF SWITCH.

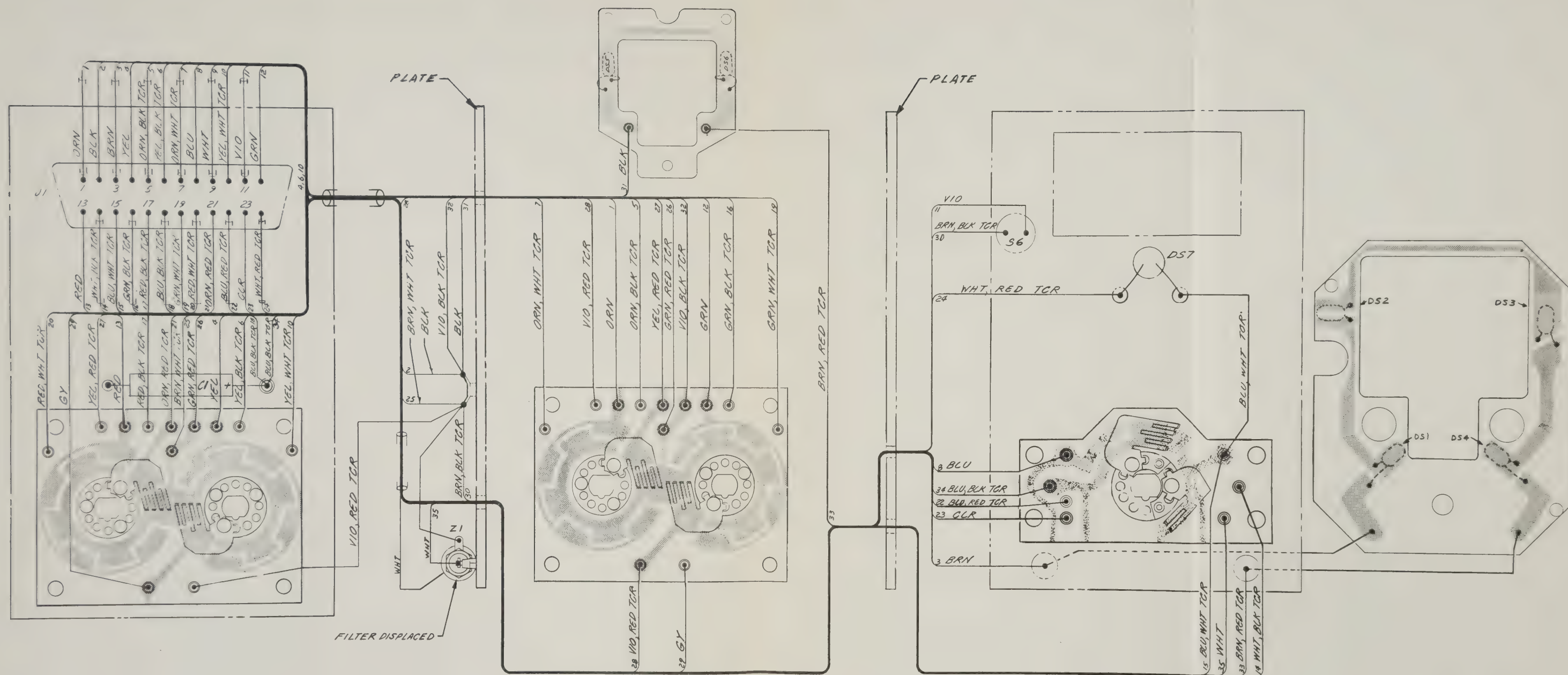
Figure 6-14. C-105B Control Unit, Schematic Diagram

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34742D(TP)

Figure 6-15. C-105B Control Unit,
Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-14.
2. ASSEMBLIES DISPLACED FOR CLARITY.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG, SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG, BARE, SOLID, TINNED COPPER.
5. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED \Rightarrow .

34742D(TP)

Figure 6-15. C-105B Control Unit,
Wiring Diagram

SECTION VII

PARTS LIST

This section lists and describes the replaceable parts for the RT-105A Receiver-Transmitter, the CO-105A Coder, and the C-105B Control Unit. Parts information for the M-41A and M-42A Mountings is included in the "Series 40 Mountings" instruction book (part no. 7010090). The parts for the A-105A Antenna and FL-105A Filter are nonprocurable.

The parts for the RT-105A Receiver-Transmitter and the CO-105A Coder are listed in an alphabetical-numerical sequence of the reference designations assigned to the parts.

The parts for the C-105B Control Unit are listed in a suggested order of disassembly, except for attaching parts which are listed directly after the part attached. Index numbers are assigned to each part and keyed to an exploded view. For cross-reference, a part number numerical index and a reference designation index are included following the parts list.

Unit and accessory part numbers are listed in Table 1-1. In the following parts lists, ARC part numbers are listed in a separate column. Other manufacturers' part numbers are identified by a code and listed either in a separate column or at the end of the part description. The codes used in the parts lists and the identifying names and addresses of the manufacturers are as follows:

<u>Code</u>	<u>Name and Address</u>	<u>Code</u>	<u>Name and Address</u>
AB	Allen-Bradley Co. Milwaukee, Wisconsin	GAEM	Good-All Electric Mfg. Co. Ogallala, Nebraska
ALD	Aladdin Electronics Division of Aladdin Industries, Inc. Nashville, Tennessee	GE	General Electric Co. Miniature Lamp Dept. Nela Park, Cleveland, Ohio
AML	Applied Microwave Laboratory, Inc. Wakefield, Massachusetts		Semiconductor Products Dept. Syracuse, New York
AMP	Amphenol-Borg Electronics Corp. Broadview (Chicago), Illinois	GRAH	Grayhill, Inc. LaGrange, Illinois
CGT	Cambridge Thermionic Corp. Cambridge, Massachusetts	GVC	G-V Controls, Inc. Livingston, New Jersey
CHM	Chicago Miniature Lamp Works Chicago, Illinois	HRC	Hoffman Electronics Corp. Los Angeles, California
DABU	Dale Products, Inc. Columbus, Nebraska	HUG	Hughes Products Division of Hughes Aircraft Co. Los Angeles, California
DI	Diodes, Inc. Canoga Park, California	IPC	Industrial Products Co., Div. Amphenol-Borg Electronics Corp. Danbury, Connecticut
EMM	Electro Motive Mfg. Co. Willimantic, Connecticut	IRC	International Resistor Co. Chicago, Illinois
ERC	Erie Resistor Corp. Erie, Pennsylvania	JFE	Jeffers Electronics Corp. St. Marys, Pennsylvania
FMCD	Microdot, Inc. South Pasadena, California	MAL	Mallory Semiconductor Co. Div. of P. R. Mallory & Co., Inc. Duquoin, Illinois

<u>Code</u>	<u>Name and Address</u>	<u>Code</u>	<u>Name and Address</u>
MEC	Magnetic Engineering Corp. Danbury, Connecticut	SH	Shakeproof Division Illinois Tool Works Elgin, Illinois
MLI	Machlett Laboratories, Inc. Springdale, Connecticut	SLE	Sylvania Electric Products, Inc. Semiconductor Division Woburn, Massachusetts
MOTR	Motorola Inc. Semiconductor Products Div. Phoenix, Arizona	SPR	Sprague Electric Co. North Adams, Massachusetts
PHCO	Philco Corporation Lansdale Division Lansdale, Pennsylvania	TI	Texas Instruments, Inc. Semiconductor-Components Div. Dallas, Texas
PK	Parker-Kalon Division General American Transportation Corp. Clifton, New Jersey	USS	U.S. Semiconductor Products Co., Inc. Phoenix, Arizona
RCA	Radio Corporation of America Semiconductor & Materials Division Somerville, New Jersey	WKI	Waldes Kohinoor, Inc. Long Island City, New York

RT-105A RECEIVER-TRANSMITTER

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
C1	NOT USED		
C2	CAPACITOR, Fixed, ceramic, 2200 pf ± 10 per cent, 200 vdcw	28448-0222	ERC type GP4
C3	NOT USED		
C4	NOT USED		
C5	NOT USED		
C6	CAPACITOR, Variable, ceramic, 1.5–12.5 pf, 500 vdcw	27651-0002	CGT PCST-50
C7	CAPACITOR, Fixed, ceramic, 27 pf ± 2 per cent, 500 vdcw	8766-0270	
C8	Same as C6		
C9	CAPACITOR, Fixed, ceramic, 6 pf ± 0.25 pf, 500 vdcw	8765-9601	
C10	CAPACITOR, Fixed, plastic, 0.015 μ f ± 10 per cent, 200 vdcw	31047-9153	SPR type 192P
C11	CAPACITOR, Fixed, plastic, 0.01 μ f ± 20 per cent, 50 vdcw	8996-9103	GAEM type 601PE
C12	CAPACITOR, Fixed, electrolytic, 1 μ f ± 20 per cent, 35 vdcw	21485-9101	SPR 150D105X0035A2
C13	CAPACITOR, Fixed, plastic, 0.047 μ f ± 10 per cent, 200 vdcw	31047-9473	SPR type 192P
C14	CAPACITOR, Fixed, electrolytic, 1 μ f ± 10 per cent, 50 vdcw at +85 DegC, 33 vdcw at +125 DegC	31289-9101	SPR type 150D
C15	CAPACITOR, Fixed, electrolytic, 2 μ f +30 -15 per cent, 100 vdcw	31288-9201	SPR type 112D
C16	CAPACITOR, Fixed, plastic, 0.047 μ f ± 20 per cent, 50 vdcw	8996-9473	GAEM type 601PE
C17	Same as C12		
C18	CAPACITOR, Fixed, electrolytic, 5 μ f ± 15 per cent, 200 vdcw	31928-9501	SPR type 110D
C19	CAPACITOR, Fixed, electrolytic, 4 μ f +30 -15 per cent, 150 vdcw	31818-9401	SPR type 112D
C20	CAPACITOR, Fixed, paper, 0.5 μ f ± 10 per cent, 1000 vdcw	31287	GE 23F473G103
C21	Same as C20		
CR1	SEMICONDUCTOR DEVICE, Diode	31918-0004	SLE 1N416E
CR2	SEMICONDUCTOR DEVICE, Diode	31293	HUG 1N662A
CR3	Same as CR2		
CR4	Same as CR2		
CR5	Same as CR2		
CR6	Same as CR2		
CR7	Same as CR2		
CR8	Same as CR2		
CR9	SEMICONDUCTOR DEVICE, Diode	31916-0390	MAL ZA39A
CR10	SEMICONDUCTOR DEVICE, Diode	31998-0680	USS 1N4038B
CR11	SEMICONDUCTOR DEVICE, Diode	31915-0820	DI ZD82A
CR12	SEMICONDUCTOR DEVICE, Diode	8931-0401	TI 1N2070
CR13	Same as CR12		
CR14	Same as CR12		
CR15	Same as CR12		
CR16	Same as CR12		

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
CR17	Same as CR12		
CR18	Same as CR12		
CR19	Same as CR12		
CR20	SEMICONDUCTOR DEVICE, Diode	31295	DI DI530LS
CR21	Same as CR20		
CR22	SEMICONDUCTOR DEVICE, Diode	16889	GE 1N64
CR23	SEMICONDUCTOR DEVICE, Diode	33962-0201	GE C6B
CR24	Same as CR2		
FL1	Filter, Low pass, 1000 pf, 200 vdcw	32871	ERC 1203-050
FL2	Same as FL1		
FL3	Same as FL1		
FL4	Same as FL1		
J1	CONNECTOR (part of Z1) ¹		
J2	CONNECTOR (part of Z1) ¹		
J3	CONNECTOR (part of Z1) ¹		
J4	CONNECTOR (part of Z3) ¹		
J5	CONNECTOR (part of Z3) ¹		
J6	CONNECTOR (part of Z4) ¹		
J7	CONNECTOR (part of Z4) ¹		
J8	CONNECTOR (part of Z4) ¹		
J9	CONNECTOR, Receptacle, electrical	19323	FMCD 3101
J10	CONNECTOR (part of Z5) ¹		
J11	CONNECTOR, Receptacle, electrical	32374-0001	AMP 94-374
K1	RELAY, Thermal, SPST, 2 amp at 115 vac, 1 amp at 28 vdc, time range 2-75 sec. ±11 sec.	31286-1811	GVC LT-1811
L1	COIL, RF, 6.8 μH ±10 per cent	8877-9681	JFE 10102-628
L2	Same as L1		
L3	COIL ASSEMBLY	32000	
L4	COIL, RF	31984-0002	
P1	NOT USED		
P2	CONNECTOR (part of Z1) ¹		
P3	CONNECTOR (part of Z1) ¹		
P4	CONNECTOR (part of Z1) ¹		
P5	CONNECTOR (part of Z3) ¹		
P6	CONNECTOR (part of Z2) ¹		
P7	CONNECTOR (part of Z4) ¹		
P8	CONNECTOR (part of Z3) ¹		
P9	CONNECTOR (part of Z4) ¹		
P10	CONNECTOR (part of Z1) ¹		
Q1	TRANSISTOR	32359-0006	TI 2N2996
Q2	TRANSISTOR	31351	PHCO 2N2087
Q3	Same as Q2		
Q4	TRANSISTOR	31411	PHCO 2N1499A
Q5	TRANSISTOR	27481-0004	TI 2N1304
R1	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4 w	200-0681	AB CB6811
R2	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/4 w	341-0102	AB CB1025
R3	RESISTOR, Fixed, comp, 3300 ohms ±5 per cent, 1/4 w	341-0332	AB CB3325

¹Nonprocurable part.

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
R4	RESISTOR, Fixed, comp, 6800 ohms ± 5 per cent, 1/4 w	341-0682	AB CB6825
R5	RESISTOR, Fixed, comp, 2200 ohms ± 5 per cent, 1/4 w	341-0222	AB CB2225
R6	NOT USED		
R7	RESISTOR, Fixed, comp, 6200 ohms ± 5 per cent, 1 w	202-0622	AB GB6225
R8	RESISTOR, Fixed, comp, 820 ohms ± 5 per cent, 1/4 w	341-0821	AB CB8215
R9	RESISTOR, Fixed, comp, 4700 ohms ± 5 per cent, 1/4 w	341-0472	AB CB4725
R10	RESISTOR, Fixed, comp, 1200 ohms ± 5 per cent, 1/4 w	341-0122	AB CB1225
R11	Same as R2		
R12	Same as R4		
R13	RESISTOR, Variable, comp, 1000 ohms ± 20 per cent, 1/4 w	28264-0102	AB type F
R14	RESISTOR, Fixed, comp, 22 ohms ± 5 per cent, 1/2 w	201-0220	AB EB2205
R15	Same as R2		
R16	RESISTOR, Fixed, comp, 100 ohms ± 5 per cent, 1/4 w	341-0101	AB CB1015
R17	Same as R2		
R18	Same as R2		
R19	RESISTOR, Fixed, comp, 2400 ohms ± 5 per cent, 1/4 w	201-0242	AB EB2425
R20	RESISTOR, Fixed, ww, 2700 ohms ± 3 per cent, 5 w	30068-0272	DABU type RH-5
R21	RESISTOR, Fixed, comp, 2700 ohms ± 5 per cent, 2 w	203-0272	AB HB2725
R22	RESISTOR, Fixed, comp, 15 ohms ± 5 per cent, 1/2 w	201-0150	AB EB1505
R23	RESISTOR, Fixed, comp, 4.7 megohms ± 5 per cent, 1 w	202-0475	AB GB4755
R24	Same as R16		
R25	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 1/4 w	341-0331	AB CB3315
R26	RESISTOR, Variable, comp, 1000 ohms ± 20 per cent, 0.5 w	8915-0102	AB GLU1022SD3028L
R27	RESISTOR, Fixed, comp, 820 ohms ± 5 per cent, 1/4 w	341-0821	AB CB8215
R28	RESISTOR, Fixed, comp, 68 ohms ± 10 per cent, 1/2 w	344-0680	AB EB6801
R29	Same as R16		
R30	RESISTOR, Fixed, comp, 100,000 ohms ± 5 per cent, 1/4 w	341-0104	AB CB1045
R31	Same as R9		
R32	Same as R5		
R33	Same as R9		
R34	RESISTOR, Fixed, comp, 47,000 ohms ± 5 per cent, 1/4 w	341-0473	AB CB4735
R35	Same as R2		
T1	TRANSFORMER, Pulse	31291	ALD 94-1568
T2	TRANSFORMER, Power, step-down	31460	MEC M-334
T3	TRANSFORMER, Power, step-up	31461	MEC M-341
V1	ELECTRON TUBE, Type 8058	700-0251	
V2	ELECTRON TUBE	31292-0002	MLI ML-7815/R

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
W1	CABLE ASSEMBLY (part of Z1) ¹		
W2	CABLE ASSEMBLY (part of Z1) ¹		
W3	CABLE ASSEMBLY (part of Z3) ¹		
W4	CABLE ASSEMBLY (part of Z4) ¹		
W5	CABLE ASSEMBLY (part of Z2) ¹		
Z1	DIPLEXER	32745	AML 147-500
Z2	MIXER	32746	AML 147-400
Z3	PRESELECTOR	32744	AML 147-300
Z4	CAVITY, Oscillator, receiver	31898	AML 147-100
Z5	CAVITY, Oscillator, transmitter	31897	AML 147-200

¹Nonprocurable part.

CO-105A CODER

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
I-F AMPLIFIER-DETECTOR ASSEMBLY A1 (31981)			
C1	CAPACITOR, Fixed, ceramic, 470 pf ± 10 per cent, 200 vdcw	28448-0471	ERC type GP4
C2	NOT USED		
C3	NOT USED		
C4	NOT USED		
C5	CAPACITOR, Fixed, ceramic, 1000 pf ± 20 per cent, 500 vdcw	8981-0102	AB type FA5C
C6	Same as C5		
C7	CAPACITOR, Fixed, ceramic, 1000 pf ± 100 -0 per cent, 500 vdcw	28051-0102	AB SS5A-102W
C8	CAPACITOR, Variable, ceramic, 2-8 pf, 350 vdcw	30309-0001	ERC type 538-003
C9	CAPACITOR, Variable, ceramic, 5.5-18 pf, 350 vdcw	30309-0001	ERC type 538-003
C10	CAPACITOR, Fixed, ceramic, 5 pf ± 0.25 pf, 500 vdcw	8791-9501	
C11	Same as C5		
C12	Same as C5		
C13	Same as C7		
C14	CAPACITOR, Fixed, ceramic, 1000 pf ± 10 per cent, 200 vdcw	28448-0102	ERC type GP4
C15	Same as C5		
C16	Same as C8		
C17	Same as C8		
C18	Same as C9		
C19	CAPACITOR, Fixed, ceramic, 15 pf ± 2 per cent, 500 vdcw	8791-0150	
C20	Same as C5		
C21	Same as C5		
C22	Same as C7		
C23	Same as C14		
C24	Same as C5		
C25	Same as C8		
C26	Same as C8		
C27	Same as C9		
C28	NOT USED		
C29	Same as C5		
C30	Same as C5		
C31	Same as C7		
C32	Same as C8		
C33	Same as C8		
C34	Same as C5		
C35	Same as C5		
C36	Same as C8		
C37	Same as C5		
C38	Same as C7		
C39	Same as C9		
C40	NOT USED		
C41	CAPACITOR, Fixed, plastic, 0.047 μ f ± 20 per cent, 50 vdcw	8996-9473	GAEM type 601PE

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
I-F AMPLIFIER-DETECTOR ASSEMBLY A1 (31981) - Continued			
C42	CAPACITOR, Fixed, electrolytic, 10 μ f \pm 20 per cent, 20 vdcw	8914-0100	SPR 150D106X0020B2
C43	Same as C41		
C44	Same as C41		
C45	Same as C5		
C46	Same as C42		
C47	Same as C5		
C48	Same as C7		
CR1	SEMICONDUCTOR DEVICE, Diode	31765-0013	GE 1N3713
CR2	Same as CR1		
CR3	SEMICONDUCTOR DEVICE, Diode, type 1N23B	12974	
CR4	SEMICONDUCTOR DEVICE, Diode	31293	HUG 1N662A
L1	NOT USED		
L2	NOT USED		
L3	NOT USED		
L4	COIL ASSEMBLY, RF	31983-0004	
L5	COIL ASSEMBLY, RF	32001-0001	
L6	COIL, RF, 6.8 μ H \pm 10 per cent	8877-9681	JFE 10102-628
L7	COIL, RF, 0.8 μ H	31986-0004	
L8	Same as L4		
L9	Same as L5		
L10	Same as L6		
L11	Same as L7		
L12	Same as L4		
L13	Same as L5		
L14	COIL, RF	31983-0003	
L15	COIL, RF	31986-0002	
L16	COIL, RF	31983-0002	
L17	Same as L7		
Q1	TRANSISTOR	32009	SPR 2N2398
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Same as Q1		
Q5	TRANSISTOR	31411	PHCO 2N1499A
Q6	Same as Q5		
R1	RESISTOR, Fixed, comp, 56 ohms \pm 5 per cent, 1/4 w	341-0560	AB CB5605
R2	RESISTOR, Fixed, comp, 5600 ohms \pm 5 per cent, 1/4 w	341-0562	AB CB5625
R3	RESISTOR, Fixed, comp, 2200 ohms \pm 5 per cent, 1/4 w	341-0222	AB CB2225
R4	RESISTOR, Fixed, comp, 47 ohms \pm 5 per cent, 1/4 w	341-0470	AB CB4705
R5	RESISTOR, Fixed, comp, 1500 ohms \pm 5 per cent, 1/4 w	341-0152	AB CB1525
R6	Same as R5		
R7	Same as R1		
R8	Same as R2		
R9	Same as R3		
R10	Same as R4		
R11	Same as R5		
R12	Same as R4		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
I-F AMPLIFIER-DETECTOR ASSEMBLY A1 (31981) - Continued			
R13	RESISTOR, Fixed, comp, 110 ohms ± 5 per cent, 1/4 w	341-0111	AB CB1115
R14	Same as R1		
R15	RESISTOR, Fixed, comp, 1100 ohms ± 5 per cent, 1/4 w	341-0112	AB CB1125
R16	Same as R2		
R17	Same as R3		
R18	Same as R4		
R19	Same as R5		
R20	Same as R4		
R21	Same as R13		
R22	Same as R1		
R23	Same as R15		
R24	Same as R2		
R25	Same as R3		
R26	Same as R4		
R27	Same as R5		
R28	Same as R5		
R29	Same as R5		
R30	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 1/4 w	341-0151	AB CB1515
R31	RESISTOR, Fixed, comp, 10 ohms ± 5 per cent, 1/4 w	341-0100	AB CB1005
R32	RESISTOR, Fixed, comp, 27,000 ohms ± 5 per cent, 1/4 w	341-0273	AB CB2735
R33	Same as R5		
R34	RESISTOR, Fixed, comp, 1000 ohms ± 5 per cent, 1/4 w	341-0102	AB CB1025
R35	Same as R2		
R36	RESISTOR, Fixed, comp, 7500 ohms ± 5 per cent, 1/4 w	341-0752	AB CB7525
R37	RESISTOR, Fixed, comp, 8200 ohms ± 5 per cent, 1/4 w	341-0822	AB CB8225
R38	Same as R37		
R39	RESISTOR, Fixed, comp, 220 ohms ± 5 per cent, 1/4 w	341-0221	AB CB2215
R40	RESISTOR, Fixed, comp, 1800 ohms ± 5 per cent, 1/4 w	341-0182	AB CB1825
R41	RESISTOR, Fixed, comp, 680 ohms ± 5 per cent, 1/4 w	341-0681	AB CB6815
R42	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 1/4 w	341-0331	AB CB3315
R43	Same as R3		
R44	Same as R37		
R45	Same as R37		
R46	RESISTOR, Fixed, comp, 120 ohms ± 5 per cent, 1/4 w	341-0121	AB CB1215
R47	RESISTOR, Fixed, comp, 1200 ohms ± 5 per cent, 1/4 w	341-0122	AB CB1225
R48	Same as R1		
R49	Same as R1		
R50	Same as R34		
V1	ELECTRON TUBE, Type 7587	700-0238	

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988)			
C1	CAPACITOR, Fixed, plastic, 0.047 μ f \pm 20 per cent, 50 vdcw	8996-9473	GAEM type 601PE
C2	CAPACITOR, Fixed, ceramic, 100 pf \pm 10 per cent, 200 vdcw	28448-0101	ERC type GP4
C3	CAPACITOR, Fixed, electrolytic, 1 μ f \pm 20 per cent, 35 vdcw	21485-9101	SPR 150D105X0035A2
C4	CAPACITOR, Fixed, mica, 470 pf \pm 5 per cent, 500 vdcw	27513-0471	EMM type DM-19
C5	Same as C3		
C6	Same as C1		
C7	CAPACITOR, Fixed, ceramic, 2200 pf \pm 10 per cent, 200 vdcw	28448-0222	ERC type GP4
C8	Same as C7		
C9	Same as C7		
C10	Same as C7		
C11	CAPACITOR, Fixed, mica, 4700 pf \pm 5 per cent, 500 vdcw	27513-0472	EMM type DM-19
C12	Same as C2		
C13	Same as C2		
C14	CAPACITOR, Fixed, plastic, 0.022 μ f \pm 20 per cent, 50 vdcw	8996-9223	GAEM type 601PE
C15	CAPACITOR, Fixed, ceramic, 6800 pf \pm 10 per cent, 200 vdcw	28448-0682	ERC type GP4
C16	Same as C3		
C17	CAPACITOR, Fixed, mica, 1000 pf \pm 5 per cent, 500 vdcw	27513-0102	EMM type DM-19
C18	CAPACITOR, Fixed, ceramic, 39 pf \pm 10 per cent, 200 vdcw	28448-0390	ERC type GP4
C19	Same as C2		
C20	Same as C2		
C21	CAPACITOR, Fixed, ceramic, 1000 pf \pm 10 per cent, 200 vdcw	28448-0102	ERC type GP4
C22	CAPACITOR, Fixed, ceramic, 220 pf \pm 10 per cent, 200 vdcw	28448-0221	ERC type GP4
C23	CAPACITOR, Fixed, plastic, 0.01 μ f \pm 20 per cent, 50 vdcw	8996-9103	GAEM type 601PE
C24	Same as C21		
C25	CAPACITOR, Fixed, mica, 220 pf \pm 5 per cent, 500 vdcw	27512-0221	EMM type DM-15
C26	Same as C2		
C27	Same as C21		
C28	Same as C25		
C29	Same as C25		
C30	Same as C17		
C31	Same as C18		
C32	Same as C2		
C33	Same as C23		
C34	CAPACITOR, Fixed, mica, 2400 pf \pm 5 per cent, 500 vdcw	27513-0242	EMM type DM-19
C35	Same as C18		
C36	Same as C2		
C37	Same as C2		
C38	Same as C21		
C39	Same as C22		
C40	Same as C23		
C41	Same as C21		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988) - Continued			
C42	CAPACITOR, Fixed, mica, 240 pf ± 5 per cent, 500 vdcw	27512-0241	EMM type DM-15
C43	Same as C2		
C44	Same as C21		
C45	Same as C17		
C46	Same as C17		
C47	Same as C34		
C48	Same as C18		
C49	Same as C2		
C50	Same as C23		
C51	Same as C21		
C52	Same as C21		
C53	Same as C21		
C54	Same as C22		
C55	Same as C22		
CR1 thru CR44	SEMICONDUCTOR DEVICE, Diode	31293	HUG 1N662A
Q1	TRANSISTOR	31411	PHCO 2N1499A
Q2	TRANSISTOR	33789	MOTR 2N706M
Q3	Same as Q1		
Q4	Same as Q1		
Q5	TRANSISTOR	31410-0011	RCA 2N711
Q6	Same as Q5		
Q7	Same as Q1		
Q8	Same as Q1		
Q9	TRANSISTOR	27481-0004	TI 2N1304
Q10	TRANSISTOR	29654	RCA 2N706A
Q11	TRANSISTOR	22292	RCA 2N585
Q12	Same as Q11		
Q13	TRANSISTOR	27481-0005	TI 2N1305
Q14	Same as Q10		
Q15	Same as Q9		
Q16	Same as Q10		
Q17	Same as Q10		
Q18	Same as Q1		
Q19	Same as Q5		
Q20	Same as Q1		
Q21	Same as Q9		
Q22	Same as Q10		
Q23	Same as Q9		
Q24	Same as Q10		
Q25	Same as Q10		
Q26	Same as Q10		
Q27	Same as Q9		
Q28	Same as Q10		
Q29	Same as Q10		
Q30	Same as Q1		
Q31	Same as Q5		
Q32	Same as Q1		
Q33	Same as Q9		
Q34	Same as Q10		
Q35	Same as Q9		
Q36	Same as Q10		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988) - Continued			
Q37	Same as Q10		
Q38	Same as Q11		
Q39	Same as Q11		
R1	RESISTOR, Variable, comp, 1000 ohms ± 20 per cent, 1/4 w	28264-0102	AB type F
R2	RESISTOR, Fixed, comp, 27,000 ohms ± 5 per cent, 1/4 w	341-0273	AB CB2735
R3	RESISTOR, Fixed, comp, 2200 ohms ± 5 per cent, 1/4 w	341-0222	AB CB2225
R4	RESISTOR, Fixed, comp, 1000 ohms ± 5 per cent, 1/4 w	341-0102	AB CB1025
R5	RESISTOR, Fixed, comp, 270 ohms ± 5 per cent, 1/4 w	341-0271	AB CB2715
R6	RESISTOR, Fixed, comp, 220,000 ohms ± 5 per cent, 1/4 w	341-0224	AB CB2245
R7	RESISTOR, Fixed, comp, 12,000 ohms ± 5 per cent, 1/4 w	341-0123	AB CB1235
R8	Same as R3		
R9	Same as R4		
R10	RESISTOR, Fixed, comp, 5600 ohms ± 5 per cent, 1/4 w	341-0562	AB CB5625
R11	RESISTOR, Fixed, comp, 3300 ohms ± 5 per cent, 1/4 w	341-0332	AB CB3325
R12	RESISTOR, Fixed, comp, 47 ohms ± 5 per cent, 1/4 w	341-0470	AB CB4705
R13	RESISTOR, Fixed, comp, 56,000 ohms ± 5 per cent, 1/4 w	341-0563	AB CB5635
R14	Same as R4		
R15	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 1/4 w	341-0331	AB CB3315
R16	RESISTOR, Fixed, comp, 510 ohms ± 5 per cent, 1/4 w	341-0511	AB CB5115
R17	Same as R4		
R18	RESISTOR, Fixed, comp, 4700 ohms ± 5 per cent, 1/4 w	341-0472	AB CB4725
R19	Same as R11		
R20	Same as R3		
R21	Same as R18		
R22	Same as R3		
R23	Same as R18		
R24	RESISTOR, Fixed, comp, 680 ohms ± 5 per cent, 1/4 w	341-0681	AB CB6815
R25	Same as R10		
R26	Same as R4		
R27	Same as R16		
R28	Same as R10		
R29	RESISTOR, Fixed, comp, 47,000 ohms ± 5 per cent, 1/4 w	341-0473	AB CB4735
R30	Same as R4		
R31	RESISTOR, Fixed, comp, 68,000 ohms ± 5 per cent, 1/4 w	341-0683	AB CB6835
R32	RESISTOR, Fixed, comp, 1500 ohms ± 5 per cent, 1/4 w	341-0152	AB CB1525
R33	RESISTOR, Fixed, comp, 470 ohms ± 5 per cent, 1/4 w	341-0471	AB CB4715

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988) - Continued			
R34	RESISTOR, Fixed, comp, 10,000 ohms ± 5 per cent, 1/4 w	341-0103	AB CB1035
R35	RESISTOR, Fixed, comp, 6800 ohms ± 5 per cent, 1/4 w	341-0682	AB CB6825
R36	Same as R4		
R37	Same as R34		
R38	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 1/4 w	341-0151	AB CB1515
R39	Same as R4		
R40	Same as R34		
R41	Same as R4		
R42	Same as R2		
R43	Same as R2		
R44	Same as R34		
R45	Same as R3		
R46	Same as R2		
R47	Same as R32		
R48	Same as R5		
R49	RESISTOR, Fixed, comp, 15,000 ohms ± 5 per cent, 1/4 w	341-0153	AB CB1535
R50	RESISTOR, Fixed, comp, selected value, 47,000 to 68,000 ohms ± 5 per cent, 1/4 w	341-* ²	AB type CB
R51	Same as R32		
R52	Same as R4		
R53	Same as R31		
R54	Same as R31		
R55	Same as R34		
R56	RESISTOR, Fixed, comp, 3600 ohms ± 5 per cent, 1/4 w	341-0362	AB CB3625
R57	Same as R34		
R58	Same as R4		
R59	Same as R18		
R60	Same as R18		
R61	Same as R4		
R62	Same as R3		
R63	Same as R4		
R64	Same as R4		
R65	Same as R4		
R66	RESISTOR, Fixed, comp, 22,000 ohms ± 5 per cent, 1/4 w	341-0223	AB CB2235
R67	Same as R34		
R68	Same as R4		
R69	Same as R3		
R70	Same as R33		
R71	RESISTOR, Fixed, comp, 390 ohms ± 5 per cent, 1/4 w	341-0391	AB CB3915
R72	Same as R11		
R73	RESISTOR, Fixed, comp, 3900 ohms ± 5 per cent, 1/4 w	341-0392	AB CB3925
R74	Same as R3		
R75	Same as R38		
R76	Same as R4		
R77	Same as R71		
R78	Same as R32		
R79	Same as R5		
R80	Same as R49		
R81	Same as R50		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.²To complete part number, replace asterisk with selected value in ohms.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988) - Continued			
R82	Same as R32	341-* ²	AB type CB
R83	Same as R31		
R84	Same as R31		
R85	Same as R34		
R86	Same as R56		
R87	Same as R34		
R88	Same as R4		
R89	Same as R4		
R90	Same as R33		
R91	Same as R4		
R92	Same as R32		
R93	Same as R5		
R94	Same as R49		
R95	RESISTOR, Fixed, comp, selected value, 68,000 to 100,000 ohms ± 5 per cent, 1/4 w		
R96	Same as R32		
R97	Same as R4		
R98	Same as R31		
R99	Same as R31		
R100	Same as R34		
R101	Same as R56		
R102	Same as R34		
R103	Same as R4		
R104	Same as R18		
R105	Same as R18		
R106	Same as R4		
R107	Same as R3		
R108	Same as R4		
R109	Same as R4		
R110	Same as R4		
R111	Same as R66		
R112	Same as R34		
R113	Same as R4		
R114	Same as R3		
R115	Same as R33		
R116	Same as R71		
R117	Same as R11		
R118	Same as R73		
R119	Same as R4		
R120	Same as R38		
R121	Same as R11		
R122	Same as R71		
R123	Same as R32		
R124	Same as R5		
R125	Same as R49		
R126	Same as R95		
R127	Same as R32		
R128	Same as R31		
R129	Same as R31		
R130	Same as R34		
R131	Same as R56		
R132	Same as R34		
R133	Same as R4		
R134	Same as R4		
R135	Same as R33		
R136	Same as R4		
R137	Same as R34		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.²To complete part number, replace asterisk with selected value in ohms.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
DECODER ASSEMBLY A2 (31988) - Continued			
R138	Same as R34		
R139	Same as R34		
R140	Same as R34		
R141	Same as R34		
R142	Same as R34		
R143	Same as R34		
R144	RESISTOR, Fixed, comp, 8200 ohms ± 5 per cent, 1/4 w	341-0822	AB CB8225
R145	Same as R4		
R146	RESISTOR, Fixed, comp, 100 ohms ± 5 per cent, 1/4 w	341-0101	AB CB1015
R147	Same as R1		
R148	Same as R144		
R149	Same as R146		
R150	Same as R2		
R151	Same as R2		
Z1	DELAY LINE	32568	
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979)			
C1	CAPACITOR, Fixed, mica, 4700 pf ± 5 per cent, 500 vdcw	27513-0472	EMM type DM-19
C2	CAPACITOR, Fixed, electrolytic, 10 μ f ± 20 per cent, 20 vdcw	8914-0100	SPR 150D106X0020B2
C3	CAPACITOR, Fixed, mica, 100 pf ± 5 per cent, 500 vdcw	27512-0101	EMM type DM-15
C4	CAPACITOR, Fixed, plastic, 0.022 μ f ± 20 per cent, 50 vdcw	8996-9223	GAEM type 601PE
C5	CAPACITOR, Fixed, electrolytic, 1 μ f ± 20 per cent, 35 vdcw	21485-9101	SPR 150D105X0035A2
C6	Same as C4		
C7	CAPACITOR, Fixed, mica, 15,000 pf ± 5 per cent, 500 vdcw	27514-0153	EMM type DM-30
C8	CAPACITOR, Fixed, mica, 1800 pf ± 5 per cent, 500 vdcw	27513-0182	EMM type DM-19
C9	CAPACITOR, Fixed, ceramic, 150 pf ± 2 per cent, 500 vdcw	28304-0151	
C10	Same as C2		
C11	Same as C2		
C12	CAPACITOR, Fixed, plastic, 0.01 μ f ± 20 per cent, 50 vdcw	8996-9103	GAEM type 601PE
C13	Same as C12		
C14	Same as C12		
C15	CAPACITOR, Fixed, ceramic, 56 pf ± 10 per cent, 200 vdcw	28448-0560	ERC type GP4
C16	CAPACITOR, Fixed, ceramic, 2200 pf ± 10 per cent, 200 vdcw	28448-0222	ERC type GP4
C17	CAPACITOR, Fixed, mica, 470 pf ± 5 per cent, 500 vdcw	27513-0471	EMM type DM-19
C18	Same as C15		
C19	Same as C16		
C20	CAPACITOR, Fixed, plastic, 0.33 μ f ± 20 per cent, 50 vdcw	8996-9332	GAEM type 601PE
C21	CAPACITOR, Fixed, electrolytic, 10 μ f ± 20 per cent, 35 vdcw	21485-0100	SPR 150D106X0035R2

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
C22	Same as C21		
C23	Same as C21		
C24	CAPACITOR, Fixed, electrolytic, 22 μ f \pm 20 per cent, 15 vdcw	8920-0220	SPR 150D226X0015R2
C25	CAPACITOR, Fixed, electrolytic, 40 μ f \pm 20 per cent, 10 vdcw	8919-0400	SPR 150D406X0010R2
C26	Same as C17		
C27	Same as C4		
C28	Same as C4		
C29	Same as C4		
C30	Same as C4		
C31	CAPACITOR, Fixed, ceramic, 240 pf \pm 5 per cent, 200 vdcw	31445-0241	
C32	Same as C4		
C33	Same as C4		
C34	Same as C4		
C35	Same as C4		
C36	Same as C31		
C37	Same as C4		
C38	Same as C4		
C39	Same as C4		
C40	Same as C4		
C41	Same as C31		
C42	Same as C4		
C43	Same as C4		
C44	Same as C31		
C45	Same as C4		
C46	Same as C4		
C47	Same as C4		
C48	Same as C4		
C49	Same as C31		
C50	Same as C4		
C51	Same as C4		
C52	Same as C4		
C53	Same as C4		
C54	Same as C31		
C55	Same as C4		
C56	Same as C4		
C57	Same as C4		
C58	Same as C4		
C59	Same as C31		
C60	Same as C4		
C61	Same as C4		
C62	Same as C31		
C63	CAPACITOR, Fixed, electrolytic, 120 μ f \pm 20 per cent, 10 vdcw	8919-0121	SPR 150D127X0010R2
C64	Same as C4		
C65	Same as C4		
C66	Same as C15		
C67	Same as C15		
C68	CAPACITOR, Fixed, ceramic, 4700 pf \pm 10 per cent, 200 vdcw	28448-0472	ERC type GP4
C69	CAPACITOR, Fixed, electrolytic, 47 μ f \pm 20 per cent, 50 vdcw	28786-0470	

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
CR1 thru CR8	SEMICONDUCTOR DEVICE, Diode	31293	HUG 1N662A
CR9	SEMICONDUCTOR DEVICE, Diode	31477-9511	HRC 1N751A
CR10	Same as CR9		
CR11	Same as CR9		
CR12	Same as CR9		
CR13	SEMICONDCUTOR DEVICE, Diode	8931-0201	TI 1N2069
CR14 thru CR55	Same as CR1		
J1	CONNECTOR, Receptacle, electrical	15185	IPC 18450
J2	CONNECTOR, Receptacle, electrical	32374-0003	AMP 94-378
L1	COIL, Universal wound	30805	
Q1	TRANSISTOR	22292	RCA 2N585
Q2	TRANSISTOR	29654	RCA 2N706A
Q3	Same as Q2		
Q4	TRANSISTOR	27481-0005	TI 2N1305
Q5	Same as Q4		
Q6	Same as Q4		
Q7	Same as Q4		
Q8	TRANSISTOR	27481-0004	TI 2N1304
Q9	Same as Q2		
Q10	TRANSISTOR	31411	PHCO 2N1499A
Q11	Same as Q10		
Q12	Same as Q10		
Q13	Same as Q2		
Q14	Same as Q2		
Q15	Same as Q10		
Q16	TRANSISTOR	31410-0011	RCA 2N711
Q17	Same as Q10		
Q18	Same as Q10		
Q19	Same as Q16		
Q20	Same as Q10		
Q21	Same as Q2		
Q22	TRANSISTOR	32693-0008	GE 2N657A
Q23	Same as Q1		
Q24	Same as Q10		
Q25	Same as Q1		
Q26	Same as Q10		
Q27	Same as Q1		
Q28	Same as Q10		
Q29	Same as Q1		
Q30	Same as Q10		
Q31	Same as Q1		
Q32	Same as Q10		
Q33	Same as Q1		
Q34	Same as Q10		
Q35	Same as Q1		
Q36	Same as Q10		
Q37	Same as Q1		
Q38	Same as Q10		
Q39	Same as Q1		
Q40	Same as Q10		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
R1	RESISTOR, Fixed, comp, 1000 ohms ± 5 per cent, 1/4 w	341-0102	AB CB1025
R2	RESISTOR, Fixed, comp, 15,000 ohms ± 5 per cent, 1/2 w	201-0153	AB EB1535
R3	RESISTOR, Fixed, comp, 100 ohms ± 5 per cent, 1/4 w	341-0101	AB CB1015
R4	RESISTOR, Fixed, comp, 2700 ohms ± 5 per cent, 1/4 w	341-0272	AB CB2725
R5	RESISTOR, Fixed, comp, 47,000 ohms ± 5 per cent, 1/4 w	341-0473	AB CB4735
R6	RESISTOR, Fixed, comp, 470 ohms ± 5 per cent, 1/4 w	341-0471	AB CB4715
R7	RESISTOR, FIXED, comp, 27,000 ohms ± 5 per cent, 1/4 w	341-0273	AB CB2735
R8	RESISTOR, Fixed, comp, 15,000 ohms ± 5 per cent, 1/4 w	341-0153	AB CB1535
R9	Same as R1		
R10	RESISTOR, Fixed, comp, 10,000 ohms ± 5 per cent, 1/4 w	341-0103	AB CB1035
R11	RESISTOR, Fixed, comp, 2200 ohms ± 5 per cent, 1/4 w	341-0222	AB CB2225
R12	Same as R8		
R13	Same as R11		
R14	RESISTOR, Fixed, comp, 1800 ohms ± 5 per cent, 1/4 w	341-0182	AB CB1825
R15	Same as R11		
R16	RESISTOR, Fixed, comp, 62 ohms ± 5 per cent, 1/4 w	341-0620	AB CB6205
R17	RESISTOR, Variable, comp, 100,000 ohms ± 20 per cent, 1/4 w	28264-0104	AB type F
R18	RESISTOR, Fixed, comp, 68,000 ohms ± 5 per cent, 1/4 w	341-0683	AB CB6835
R19	Same as R11		
R20	Same as R10		
R21	Same as R6		
R22	Same as R11		
R23	Same as R10		
R24	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 1/4 w	341-0331	AB CB3315
R25	RESISTOR, Fixed, comp, 560 ohms ± 5 per cent, 1/4 w	341-0561	AB CB5615
R26	Same as R3		
R27	Same as R4		
R28	Same as R11		
R29	Same as R11		
R30	Same as R9		
R31	Same as R25		
R32	Same as R1		
R33	RESISTOR, Fixed, comp, 3900 ohms ± 5 per cent, 1/4 w	341-0392	AB CB3925
R34	RESISTOR, Fixed, comp, 390 ohms ± 5 per cent, 1/4 w	341-0391	AB CB3915
R35	Same as R1		
R36	RESISTOR, Fixed, comp, 1200 ohms ± 5 per cent, 1/4 w	341-0122	AB CB1225
R37	Same as R24		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
R38	RESISTOR, Fixed, comp, 12,000 ohms ± 5 per cent, 1/4 w	341-0123	AB CB1235
R39	Same as R34		
R40	Same as R1		
R41	RESISTOR, Fixed, comp, 1500 ohms ± 5 per cent, 1/4 w	341-0152	AB CB1525
R42	Same as R8		
R43	Same as R1		
R44	Same as R1		
R45	RESISTOR, Fixed, comp, 5600 ohms ± 5 per cent, 1/4 w	341-0562	AB CB5625
R46	Same as R41		
R47	RESISTOR, Fixed, comp, 8200 ohms ± 5 per cent, 1/2 w	201-0822	AB EB8225
R48	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 1/2 w	201-0331	AB EB3315
R49	Same as R1		
R50	Same as R45		
R51	Same as R24		
R52	Same as R41		
R53	Same as R47		
R54	Same as R48		
R55	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 1/4 w	341-0151	AB CB1515
R56	Same as R24		
R57	RESISTOR, Fixed, comp, 100 ohms ± 5 per cent, 1/2 w	201-0101	AB EB1015
R58	RESISTOR, Fixed, comp, 68 ohms ± 5 per cent, 1 w	202-0681	AB GB6815
R59	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 1/2 w	201-0151	AB EB1515
R60	RESISTOR, Fixed, comp, 120 ohms ± 5 per cent, 1/2 w	201-0121	AB EB1215
R61	Same as R24		
R62	Same as R24		
R63	RESISTOR, Variable, ww, 20 ohms ± 5 per cent, 1 w	28435-0200	IRC type CT-100
R64	Same as R63		
R65	Same as R1		
R66	Same as R10		
R67	RESISTOR, Fixed, comp, 5600 ohms ± 5 per cent, 1/4 w	341-0562	AB CB5625
R68	Same as R4		
R69	RESISTOR, Fixed, comp, 270 ohms ± 5 per cent, 1/4 w	341-0271	AB CB2715
R70	Same as R36		
R71	Same as R5		
R72	Same as R5		
R73	Same as R5		
R74	Same as R5		
R75	Same as R5		
R76	Same as R5		
R77	Same as R10		
R78	Same as R67		
R79	Same as R4		
R80	Same as R69		
R81	Same as R36		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
R82	Same as R5		
R83	Same as R5		
R84	Same as R5		
R85	Same as R5		
R86	Same as R5		
R87	Same as R5		
R88	Same as R5		
R89	Same as R5		
R90	Same as R10		
R91	Same as R67		
R92	Same as R4		
R93	Same as R69		
R94	Same as R36		
R95	Same as R5		
R96	Same as R5		
R97	Same as R5		
R98	Same as R5		
R99	Same as R5		
R100	Same as R5		
R101	Same as R5		
R102	Same as R5		
R103	Same as R10		
R104	Same as R67		
R105	Same as R4		
R106	Same as R69		
R107	Same as R36		
R108	Same as R5		
R109	Same as R5		
R110	Same as R5		
R111	Same as R5		
R112	Same as R10		
R113	Same as R67		
R114	Same as R4		
R115	Same as R69		
R116	Same as R36		
R117	Same as R5		
R118	Same as R5		
R119	Same as R5		
R120	Same as R5		
R121	Same as R5		
R122	Same as R5		
R123	Same as R5		
R124	Same as R5		
R125	Same as R10		
R126	Same as R67		
R127	Same as R4		
R128	Same as R69		
R129	Same as R36		
R130	Same as R5		
R131	Same as R5		
R132	Same as R5		
R133	Same as R5		
R134	Same as R5		
R135	Same as R5		
R136	Same as R5		
R137	Same as R5		
R138	Same as R10		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
SELF-TEST ASSEMBLY A4 (34095) - Continued			
C5	CAPACITOR, Fixed, ceramic, 33 pf ± 5 per cent, 500 vdcw	30457-0330	GAEM type 601PE
C6	Same as C5		
C7	CAPACITOR, Fixed, plastic, 0.33 μ f ± 20 per cent, 50 vdcw	8996-9332	
C8	Same as C5		
C9	CAPACITOR, Fixed, ceramic, 560 pf ± 10 per cent, 500 vdcw	31037-0561	EMM type DM-15
C10	CAPACITOR, Fixed, mica, 100 pf ± 2 per cent, 500 vdcw	30733-0101	
C11	CAPACITOR, Fixed, ceramic, 0.022 μ f ± 80 -20 per cent, 500 vdcw	8627-9223	
CR1 thru CR9	SEMICONDUCTOR DEVICE, Diode	31293	HUG 1N662A
Q1	TRANSISTOR	27481-0004	TI 2N1304
Q2	Same as Q1		
Q3	TRANSISTOR	29654	RCA 2N706A
Q4	Same as Q1		
Q5	Same as Q3		
Q6	Same as Q3		
Q7	Same as Q1		
Q8	TRANSISTOR	33789	MOTR 2N706M
Q9	TRANSISTOR	31351	PHCO 2N2087
R1	RESISTOR, Fixed, comp, 3300 ohms ± 5 per cent, 1/4 w	341-0332	AB CB3325
R2	RESISTOR, Fixed, comp, 100,000 ohms ± 5 per cent, 1/4 w	341-0104	AB CB1045
R3	Same as R2		
R4	Same as R1		
R5	RESISTOR, Fixed, comp, 1500 ohms ± 5 per cent, 1/4 w	341-0152	AB CB1525
R6	RESISTOR, Fixed, comp, 270 ohms ± 5 per cent, 1/4 w	341-0271	AB CB2715
R7	RESISTOR, Fixed, comp, 68,000 ohms ± 5 per cent, 1/4 w	341-0683	AB CB6835
R8	RESISTOR, Fixed, comp, selected value, 56,000 to 100,000 ohms ± 5 per cent, 1/4 w	341-* ²	AB type CB
R9	RESISTOR, Fixed, comp, 27,000 ohms ± 5 per cent, 1/4 w	341-0273	AB CB2735
R10	RESISTOR, Fixed, comp, 10,000 ohms ± 5 per cent, 1/4 w	341-0103	AB CB1035
R11	Same as R1		
R12	RESISTOR, Fixed, comp, selected value, 33,000 to 62,000 ohms ± 5 per cent, 1/4 w	341-* ²	AB type CB
R13	Same as R7		
R14	Same as R1		
R15	Same as R5		
R16	RESISTOR, Fixed, comp, 4700 ohms ± 5 per cent, 1/4 w	341-0472	AB CB4725
R17	Same as R16		
R18	Same as R16		
R19	Same as R5		

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.²To complete part number, replace asterisk with selected value in ohms.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
ENCODER-POWER SUPPLY ASSEMBLY A3 (31979) - Continued			
R139	Same as R67		
R140	Same as R4		
R141	Same as R69		
R142	Same as R36		
R143	Same as R5		
R144	Same as R5		
R145	Same as R5		
R146	Same as R5		
R147	Same as R5		
R148	Same as R5		
R149	Same as R5		
R150	Same as R5		
R151	Same as R10		
R152	Same as R67		
R153	Same as R4		
R154	Same as R69		
R155	Same as R36		
R156	Same as R5		
R157	Same as R5		
R158	Same as R10		
R159	Same as R67		
R160	Same as R4		
R161	Same as R69		
R162	Same as R36		
R163	RESISTOR, Fixed, comp, 680,000 ohms ± 5 per cent, 1/4 w	341-0684	AB CB6845
R164	Same as R3		
R165	Same as R5		
R166	Same as R5		
R167	Same as R5		
R168	RESISTOR, Fixed, comp, 100,000 ohms ± 5 per cent, 1/4 w	341-0104	AB CB1045
R169	Same as R168		
R170	Same as R168		
R171	Same as R168		
R172	Same as R67		
R173	RESISTOR, Fixed, comp, 7500 ohms ± 5 per cent, 1/4 w	341-0752	AB CB7525
R174	Same as R67		
R175	Same as R173		
R176	RESISTOR, Fixed, comp, 8200 ohms ± 5 per cent, 1/4 w	341-0822	AB CB8225
R177	Same as R176		
R178	Same as R176		
R179	Same as R176		
SELF-TEST ASSEMBLY A4 (34095)			
C1	CAPACITOR, Fixed, electrolytic, 1 μ f ± 20 per cent, 35 vdcw	21485-9101	SPR 150D105X0035A2
C2	CAPACITOR, Fixed, ceramic, 10,000 pf ± 20 per cent, 500 vdcw	31038-0103	
C3	Same as C2		
C4	CAPACITOR, Fixed, mica, 1500 pf ± 5 per cent, 500 vdcw	27513-0152	EMM type DM-19

¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation ¹	Description	ARC Part No.	Manufacturer & Part No.
SELF-TEST ASSEMBLY A4 (34095) - Continued			
R20	Same as R6		
R21	Same as R7		
R22	RESISTOR, Fixed, comp, 15,000 ohms ± 5 per cent, 1/4 w	341-0153	AB CB1535
R23	RESISTOR, Fixed, comp, selected value, 22,000 to 43,000 ohms ± 5 per cent, 1/4 w	341-* ²	AB type CB
R24	Same as R10		
R25	Same as R7		
R26	Same as R5		
R27	Same as R1		
R28	Same as R5		
R29	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 1/4 w	341-0151	AB CB1515

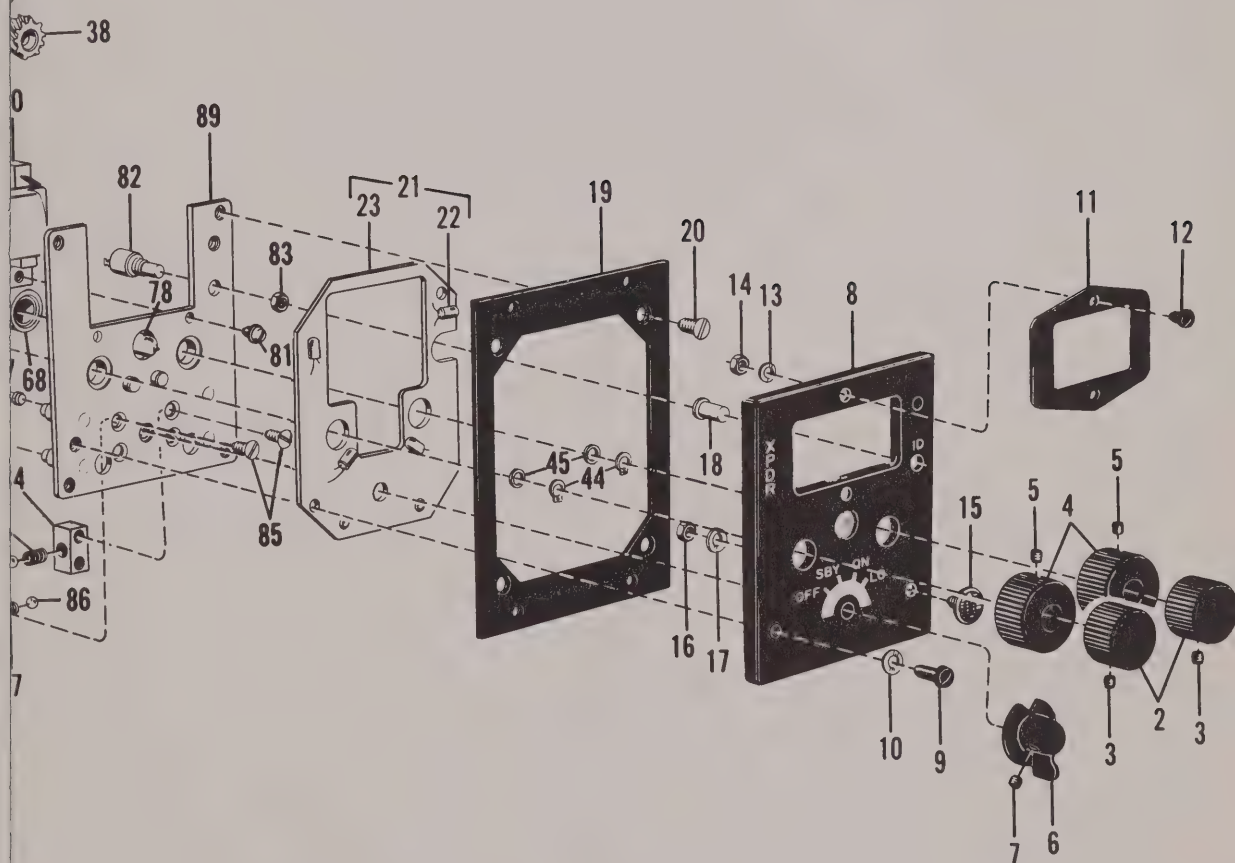
¹Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.²To complete part number, replace asterisk with selected value in ohms.

C-105B CONTROL UNIT

Figure & Index No.	ARC Part No.	1 2 3 4 5 6	Description	Units per Assy
7-1-	32740-0000		CONTROL UNIT ASSEMBLY	1
-1	28985-0005		. COVER	1
-2	32917		. KNOB	2
			(ATTACHING PARTS)	
-3	304-0008		. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 . thd by 1/8 in. lg	4
			- - - * - - -	
-4	32916		. KNOB	2
			(ATTACHING PARTS)	
-5	304-0008		. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 . thd by 1/8 in. lg	4
			- - - * - - -	
-6	33416-0000		. KNOB	1
			(ATTACHING PARTS)	
-7	304-0008		. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 . thd by 1/8 in. lg	2
			- - - * - - -	
-8	32928		. PANEL, Plastic	1
			(ATTACHING PARTS)	
-9	114-0028		. SCREW, Machine, bind. h, brs, blk oxidized, No. 4-40 thd by . 7/16 in. lg	2
-10	7730		. WASHER, Spring tension	2
			- - - * - - -	
-11	32918		. MASK	1
			(ATTACHING PARTS)	
-12	112-0012		. SCREW, Machine, bind. h, brs, blk oxidized, No. 2-56 thd by . 3/16 in. lg	2
-13	10352		. WASHER, Spring tension	2
-14	4421		. NUT, Hexagon, brs, ni pl, No. 2-56 thd by 0.062 in. thk	2
			- - - * - - -	
-15	23355		. EMBLEM	1
			(ATTACHING PARTS)	
-16	8040		. NUT, Hexagon, brs, ni pl, No. 4-40 thd by 0.062 in. thk	1
-17	7730		. WASHER, Spring tension	1
			- - - * - - -	
-18	32905		. BUTTON	1
-19	27029		. PLATE, Adapter	1
			(ATTACHING PARTS)	
-20	144-0016		. SCREW, Machine, fh, brs, ni pl, No. 4-40 thd by 1/4 in. lg . .	4
			- - - * - - -	
-21	33496		. PRINTED CIRCUIT ASSEMBLY	1
-22	32971-0002		. . LAMP, Incandescent, 5v, 0.115 amp ±10 per cent, type . . . T-1 bulb (CHM)(CM-8-715)	4
-23	32873		. . BOARD, Printed circuit.	1
-24	32779-0004		. CONNECTOR, Receptacle, electrical (AMP)(57-40240)	1
			(ATTACHING PARTS)	
-25	503-0020		. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 5/16 in. lg (SH)(SEMS)	2
			- - - * - - -	

Figure & Index No.	ARC Part No.	1 2 3 4 5 6 Description	Units per Assy
7-1-26	32743-0001	. PLATE, Identification (ATTACHING PARTS)	1
-27	8956-2010	. SCREW, Tapping, thread forming, rh, Phillips dr, stl, blk. . . Parkerized, No. 2 by 5/32 in. lg (PK)(Z) - - - * - - -	2
-28	33480	. PLATE ASSEMBLY, Rear (ATTACHING PARTS)	1
-29	503-0012	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS) - - - * - - -	4
-30	21485-9101	. CAPACITOR, Fixed, electrolytic, 1 μ f \pm 20 per cent, 35 vdcw. . (SPR)(150D105X0035A2)	1
-31	33495	. PRINTED CIRCUIT ASSEMBLY (ATTACHING PARTS)	1
-32	503-0012	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS) - - - * - - -	4
-33	33474	. SHAFT ASSEMBLY (ATTACHING PARTS)	2
-34	304-0008	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 . thd by 1/8 in. lg - - - * - - -	2
-35	33473	. . GEAR ASSEMBLY (ATTACHING PARTS)	2
-36	8775-0020	. . PIN, Spring, type MS171433 - - - * - - -	2
-37	32907-0138	. . SHAFT	2
-38	33475	. GEAR ASSEMBLY	2
-39	32899	. GEAR, Spur (ATTACHING PARTS)	2
-40	504-0036	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 4-40 thd by 9/16 in. lg (SH)(SEMS)	2
-41	19980	. WASHER, Flat, brs, ni pl, 0.116 ID by 0.437 OD by 0.031 in. thk - - - * - - -	2
-42	32915	. HUB	2
-43	33476	. SHAFT ASSEMBLY (ATTACHING PARTS)	2
-44	17743	. RING, Retaining (WKI)(5100-12-C)	2
-45	17768-0000	. SHIM - - - * - - -	2
-46	32898	. . GEAR, Spur (ATTACHING PARTS)	2
-47	8775-0020	. . PIN, Spring, type MS171433 - - - * - - -	2
-48	32894-0001	. . SHAFT, Detent.	2
-49	32901	. . SHAFT	2
-50	8141	. BALL	4
-51	20348	. SPRING	4
-52	33608-0001	. BLOCK (ATTACHING PARTS)	4
-53	103-0028	. SCREW, Machine, bind. h, brs, ni pl, No. 3-48 thd by 7/16 . . in. lg - - - * - - -	8
-54	8141	. BALL	4
-55	20348	. SPRING	4
-56	33608-0002	. BLOCK	4
-57	31161-0004	. FILTER, RF, 400 vdc, 125v at 400 cps (SPR)(2JX49)	1

Figure & Index No.	ARC Part No.	1 2 3 4 5 6	Description	Units per Assy
7-1-58	34127	.	TERMINAL, Stud.	2
			(ATTACHING PARTS)	
-59	8275	.	NUT, Hexagon, brs, ni pl, No. 2-56 thd by 0.050 in. thk	2
-60	4052	.	WASHER, Lock (SH)(1702).	2
			-----*	
-61	20789	.	TERMINAL ASSEMBLY	1
			(ATTACHING PARTS)	
-62	103-0016	.	SCREW, Machine, bind. h, brs, ni pl, No. 3-48 thd by 1/4 . . .	1
			in. lg	
-63	4103	.	WASHER, Lock (SH)(1703).	1
			-----*	
-64	33479	.	PLATE ASSEMBLY.	1
			(ATTACHING PARTS)	
-65	503-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . .	3
			lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS)	
			-----*	
-66	32894-0003	.	SHAFT, Detent.	2
			(ATTACHING PARTS)	
-67	304-0008	.	SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 .	2
			thd by 1/8 in. lg	
			-----*	
-68	33993	.	GEAR ASSEMBLY	2
-69	33495	.	PRINTED CIRCUIT ASSEMBLY	1
			(ATTACHING PARTS)	
-70	503-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . .	4
			lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS)	
			-----*	
-71	33469	.	PRINTED CIRCUIT ASSEMBLY	1
			(ATTACHING PARTS)	
-72	502-0016	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . .	3
			lockwasher, No. 2-56 thd by 1/4 in. lg (SH)(SEMS)	
			-----*	
-73	32971-0002	.	LAMP, Incandescent, 5v, 0.115 amp \pm 10 per cent, type T-1 .	2
			bulb (CHM)(CM-8-715)	
-74	32961	.	PRINTED CIRCUIT BOARD	1
-75	33478	.	PLATE ASSEMBLY.	1
			(ATTACHING PARTS)	
-76	503-0028	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . .	4
			lockwasher, No. 3-48 thd by 7/16 in. lg (SH)(SEMS)	
			-----*	
-77	31719-0016	.	SPACER.	4
-78	34043	.	LAMP, Neon (GE)(type A1C).	1
-79	33493	.	PRINTED CIRCUIT ASSEMBLY	1
-80	33643	.	DIAL UNIT ASSEMBLY	1
			(ATTACHING PARTS)	
-81	502-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . .	2
			lockwasher, No. 2-56 thd by 3/16 in. lg (SH)(SEMS)	
			-----*	
-82	32935	.	SWITCH, Push, SPST (GRAH)(39-1)	1
			(ATTACHING PART)	
-83	—	.	NUT, Hexagon (part of 32935)	1
			-----*	
-84	33608-0002	.	BLOCK	2
			(ATTACHING PARTS)	
-85	143-0016	.	SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 1/4 in. lg . .	4
			-----*	
-86	8141	.	BALL	2
-87	20348	.	SPRING	2
-88	33472	.	SHAFT ASSEMBLY	1
-89	33477	.	PANEL ASSEMBLY.	1



TP4325

Figure 7-1. C-105B Control Unit, Exploded View

Figure & Index No.	ARC Part No.	1 2 3 4 5 6	Description	Units per Assy
7-1-58	34127	.	TERMINAL, Stud. (ATTACHING PARTS)	2
-59	8275	.	NUT, Hexagon, brs, ni pl, No. 2-56 thd by 0.050 in. thk	2
-60	4052	.	WASHER, Lock (SH)(1702)	2
			- - - * - - -	
-61	20789	.	TERMINAL ASSEMBLY (ATTACHING PARTS)	1
-62	103-0016	.	SCREW, Machine, bind. h, brs, ni pl, No. 3-48 thd by 1/4 . . . in. lg	1
-63	4103	.	WASHER, Lock (SH)(1703)	1
			- - - * - - -	
-64	33479	.	PLATE ASSEMBLY (ATTACHING PARTS)	1
-65	503-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS)	3
			- - - * - - -	
-66	32894-0003	.	SHAFT, Detent (ATTACHING PARTS)	2
-67	304-0008	.	SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 . thd by 1/8 in. lg	2
			- - - * - - -	
-68	33993	.	GEAR ASSEMBLY	2
-69	33495	.	PRINTED CIRCUIT ASSEMBLY (ATTACHING PARTS)	1
-70	503-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 3/16 in. lg (SH)(SEMS)	4
			- - - * - - -	
-71	33469	.	PRINTED CIRCUIT ASSEMBLY (ATTACHING PARTS)	1
-72	502-0016	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 2-56 thd by 1/4 in. lg (SH)(SEMS)	3
			- - - * - - -	
-73	32971-0002	.	LAMP, Incandescent, 5v, 0.115 amp \pm 10 per cent, type T-1 . bulb (CHM)(CM-8-715)	2
-74	32961	.	PRINTED CIRCUIT BOARD	1
-75	33478	.	PLATE ASSEMBLY (ATTACHING PARTS)	1
-76	503-0028	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 3-48 thd by 7/16 in. lg (SH)(SEMS)	4
			- - - * - - -	
-77	31719-0016	.	SPACER	4
-78	34043	.	LAMP, Neon (GE)(type A1C)	1
-79	33493	.	PRINTED CIRCUIT ASSEMBLY	1
-80	33643	.	DIAL UNIT ASSEMBLY (ATTACHING PARTS)	1
-81	502-0012	.	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst . . . lockwasher, No. 2-56 thd by 3/16 in. lg (SH)(SEMS)	2
			- - - * - - -	
-82	32935	.	SWITCH, Push, SPST (GRAH)(39-1) (ATTACHING PART)	1
-83	—	.	NUT, Hexagon (part of 32935)	1
			- - - * - - -	
-84	33608-0002	.	BLOCK (ATTACHING PARTS)	2
-85	143-0016	.	SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 1/4 in. lg . .	4
			- - - * - - -	
-86	8141	.	BALL	2
-87	20348	.	SPRING	2
-88	33472	.	SHAFT ASSEMBLY	1
-89	33477	.	PANEL ASSEMBLY	1

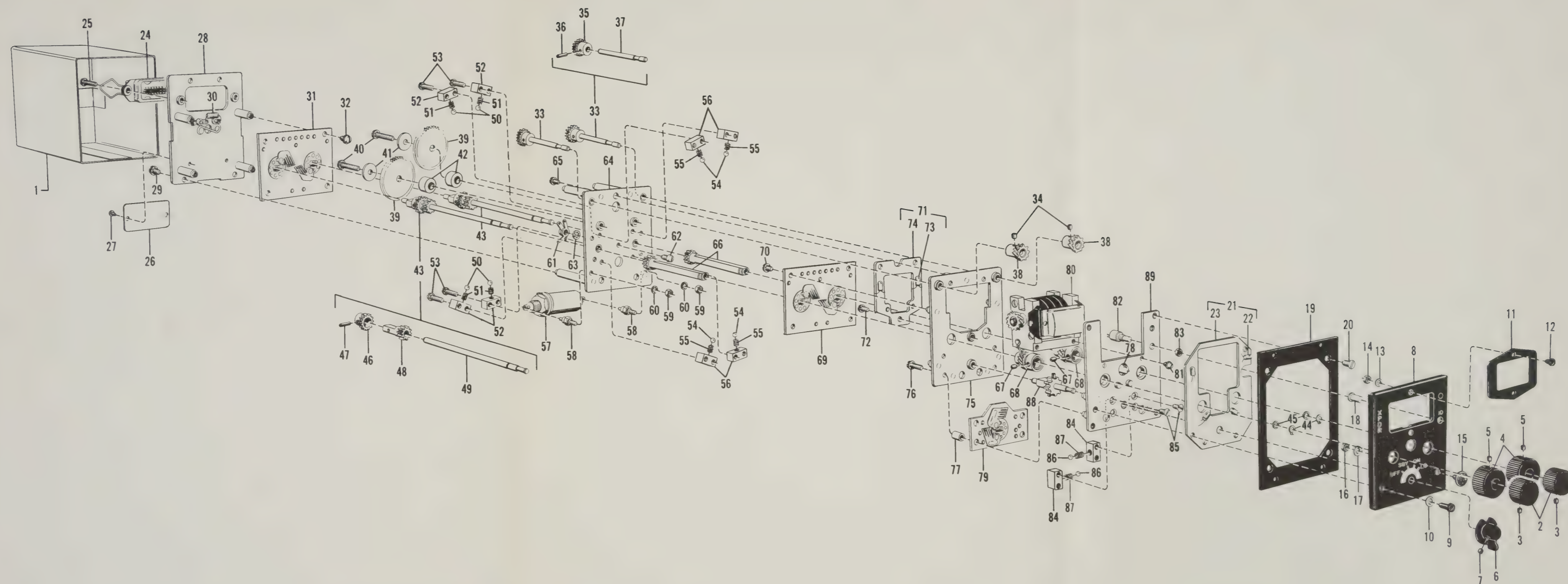


Figure 7-1. C-105B Control Unit, Exploded View

NUMERICAL INDEX

Part No.	Figure & Index No.	Total Qty
A1C	7-1-78	Ref
CM-8-715	7-1-22	Ref
	7-1-73	
MS171433	7-1-36	Ref
	7-1-47	
NUT	7-1-83	1
Z	7-1-27	Ref
103-0016	7-1-62	1
103-0028	7-1-53	8
10352	7-1-13	2
112-0012	7-1-12	2
114-0028	7-1-9	2
143-0016	7-1-85	4
144-0016	7-1-20	4
150D105X0035A2	7-1-30	Ref
1702	7-1-60	Ref
1703	7-1-63	Ref
17743	7-1-44	2
17768	7-1-45	2
19980	7-1-41	2
2JX49	7-1-57	Ref
20348	7-1-51	10
	7-1-55	
	7-1-87	
20789	7-1-61	1
21485-9101	7-1-30	1
23355	7-1-15	1
27029	7-1-19	1
28985-0005	7-1-1	1
304-0008	7-1-3	14
	7-1-5	
	7-1-7	
	7-1-34	
	7-1-67	
31161-0004	7-1-57	1
31719-0016	7-1-77	4
32740-0000	7-1-	1
32743-0001	7-1-26	1
32779-0004	7-1-24	1
32873	7-1-23	1
32894-0001	7-1-48	2
32894-0003	7-1-66	2
32898	7-1-46	2
32899	7-1-39	2
32901	7-1-49	2
32905	7-1-18	1
32907-0138	7-1-37	2
32915	7-1-42	2
32916	7-1-4	2
32917	7-1-2	2
32918	7-1-11	1
32928	7-1-8	1

Part No.	Figure & Index No.	Total Qty
32935	7-1-82	1
32961	7-1-74	1
32971-0002	7-1-22	6
	7-1-73	
33416-0000	7-1-6	1
33469	7-1-71	1
33472	7-1-88	1
33473	7-1-35	2
33474	7-1-33	2
33475	7-1-38	2
33476	7-1-43	2
33477	7-1-89	1
33478	7-1-75	1
33479	7-1-64	1
33480	7-1-28	1
33493	7-1-79	1
33495	7-1-31	2
	7-1-69	
33496	7-1-21	1
33608-0001	7-1-52	10
	7-1-56	
	7-1-84	
33643	7-1-80	1
33993	7-1-68	2
34043	7-1-78	1
34127	7-1-58	2
39-1	7-1-82	Ref
4052	7-1-60	2
4103	7-1-63	1
4421	7-1-14	2
502-0012	7-1-81	2
502-0016	7-1-72	3
503-0012	7-1-29	15
	7-1-32	
	7-1-65	
	7-1-70	
503-0020	7-1-25	2
503-0028	7-1-76	4
504-0036	7-1-40	2
5100-12-C	7-1-44	Ref
57-40240	7-1-24	Ref
7730	7-1-10	3
	7-1-17	
8040	7-1-16	1
8141	7-1-50	10
	7-1-54	
	7-1-86	
8275	7-1-59	2
8775-0020	7-1-36	4
	7-1-47	
8956-2010	7-1-27	2

REFERENCE DESIGNATION INDEX

Ref Desig	Figure & Index No.	Part No.
C1	7-1-30	21485-9101
DS1	7-1-22	32971-0002
DS2		
DS3		
DS4		
DS5	7-1-73	
DS6		
DS7	7-1-78	34043

Ref Desig	Figure & Index No.	Part No.
S1	7-1-31	33495
S2	7-1-69	
S3		
S4	7-1-31	
S5	7-1-79	33493
S6	7-1-82	32935
Z1	7-1-57	31161-0004



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